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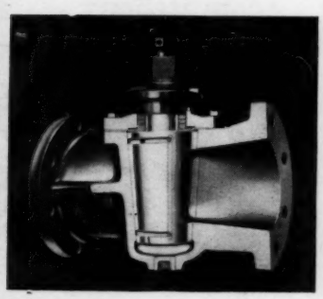
Nordstrom "Venturi" Valves on transmission lines of a California gas company.

Giving valve control without restricting flow



Cutaway view of "Venturi" type of valve

The Nordstrom "Venturi" Valve makes available a valve with extra large interior stream-lined area, yet retaining compact exterior dimensions. The patented "Sealdport" lubrication principle is embodied, offering a pressure seal substantially around each port which prevents escape of the gas either through the line when valve is closed or out to the atmosphere. Ask for Catalog No. 8.

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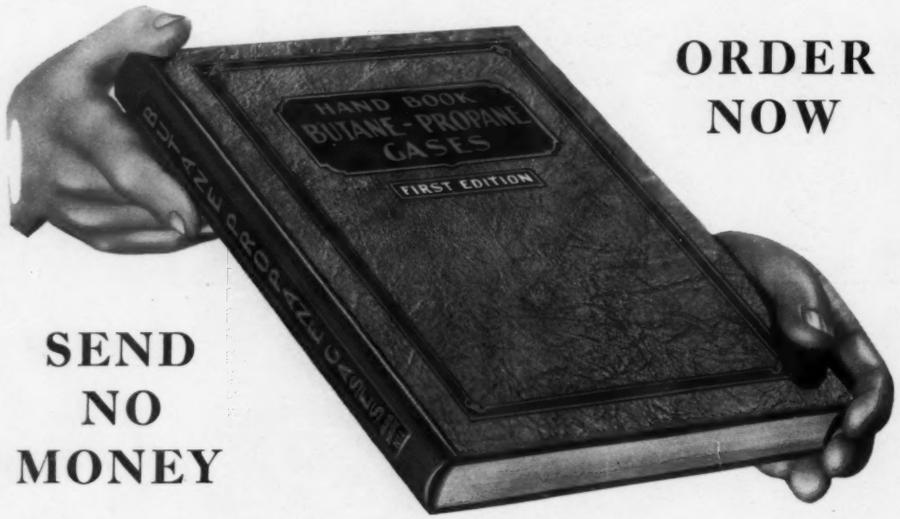

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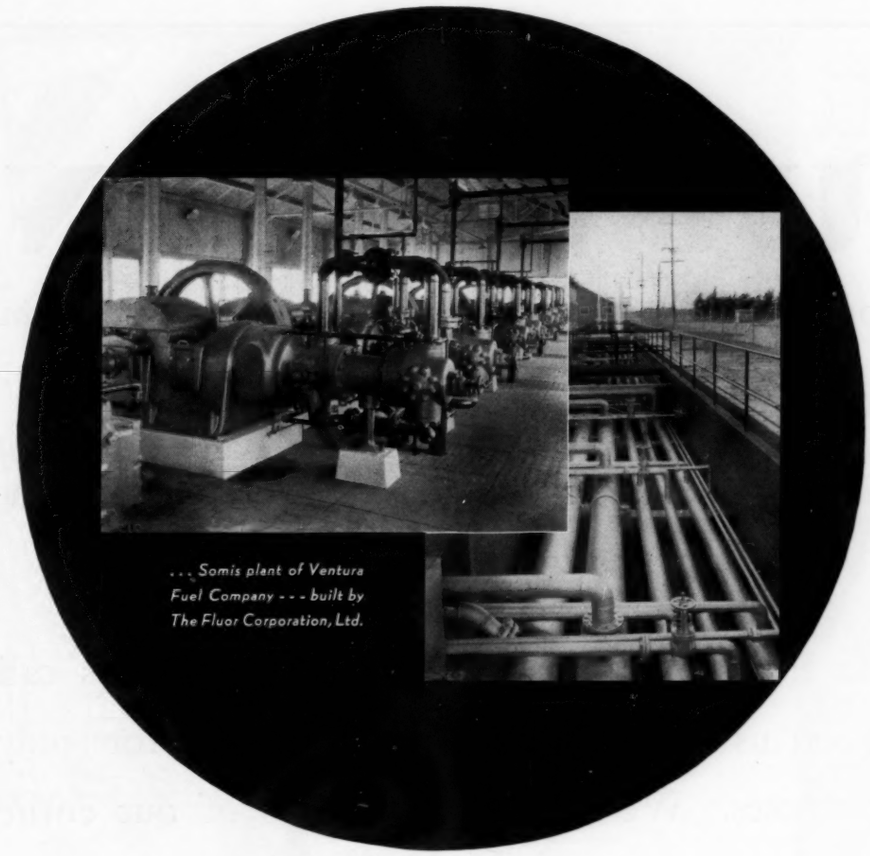

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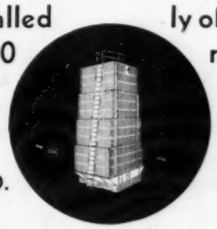

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January, 1932, Volume VIII, Number 1, Western Gas is published by Western Business Papers, Inc., at 124 West Fourth Street, Los Angeles, California. Subscription price (in advance) 20 cents the copy; $2.00 per year; 2 years, $3.00; $3.00 per year foreign. Entered as second class matter June 1, 1925, at the postoffice at Los Angeles, under the Act of March 3, 1879.

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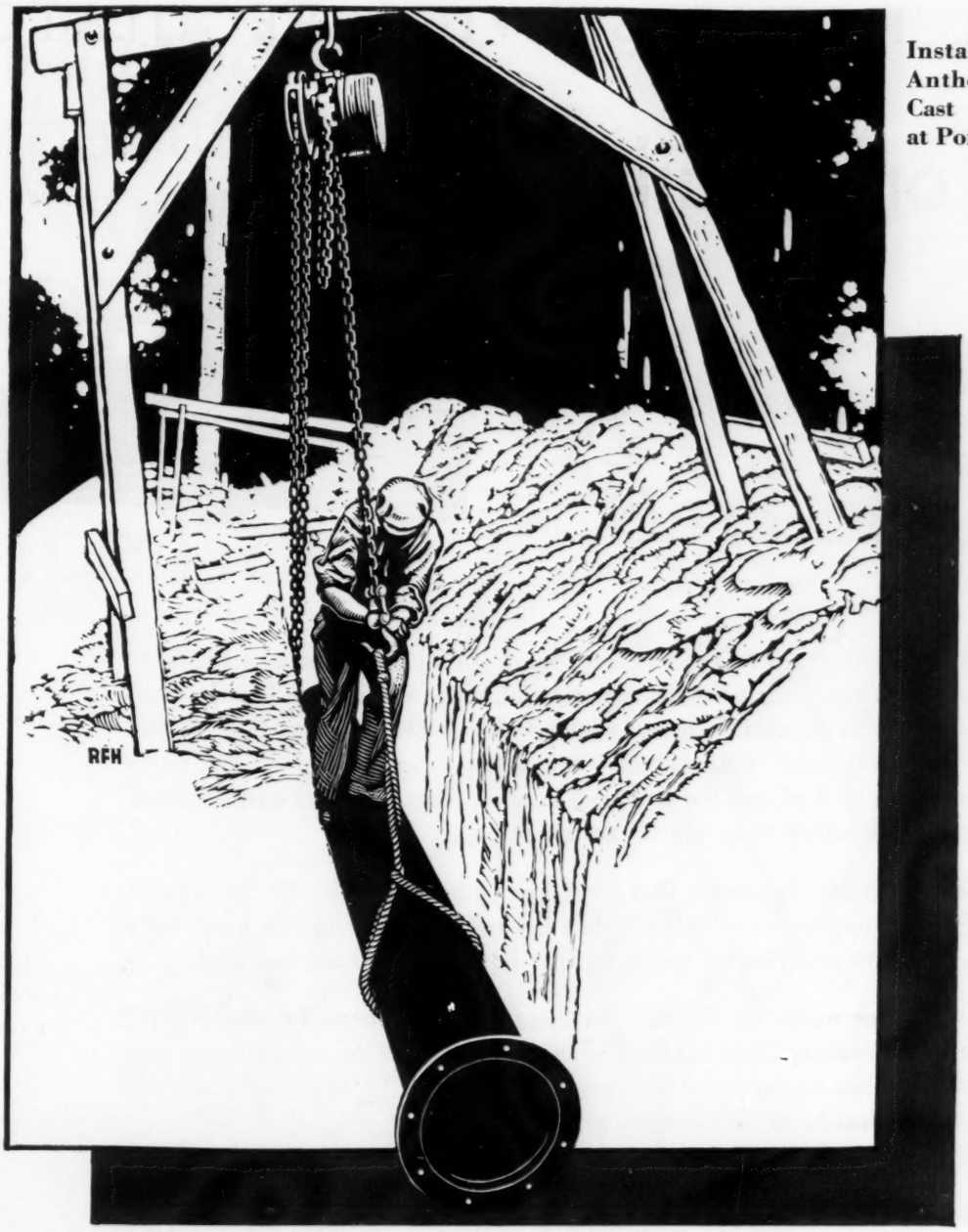

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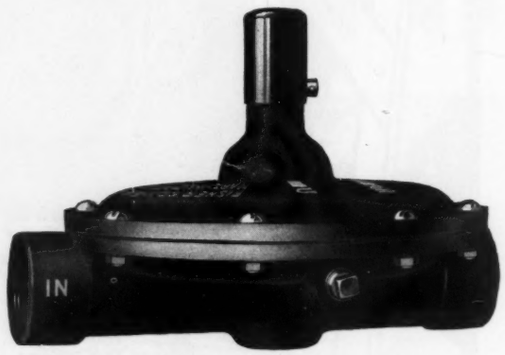

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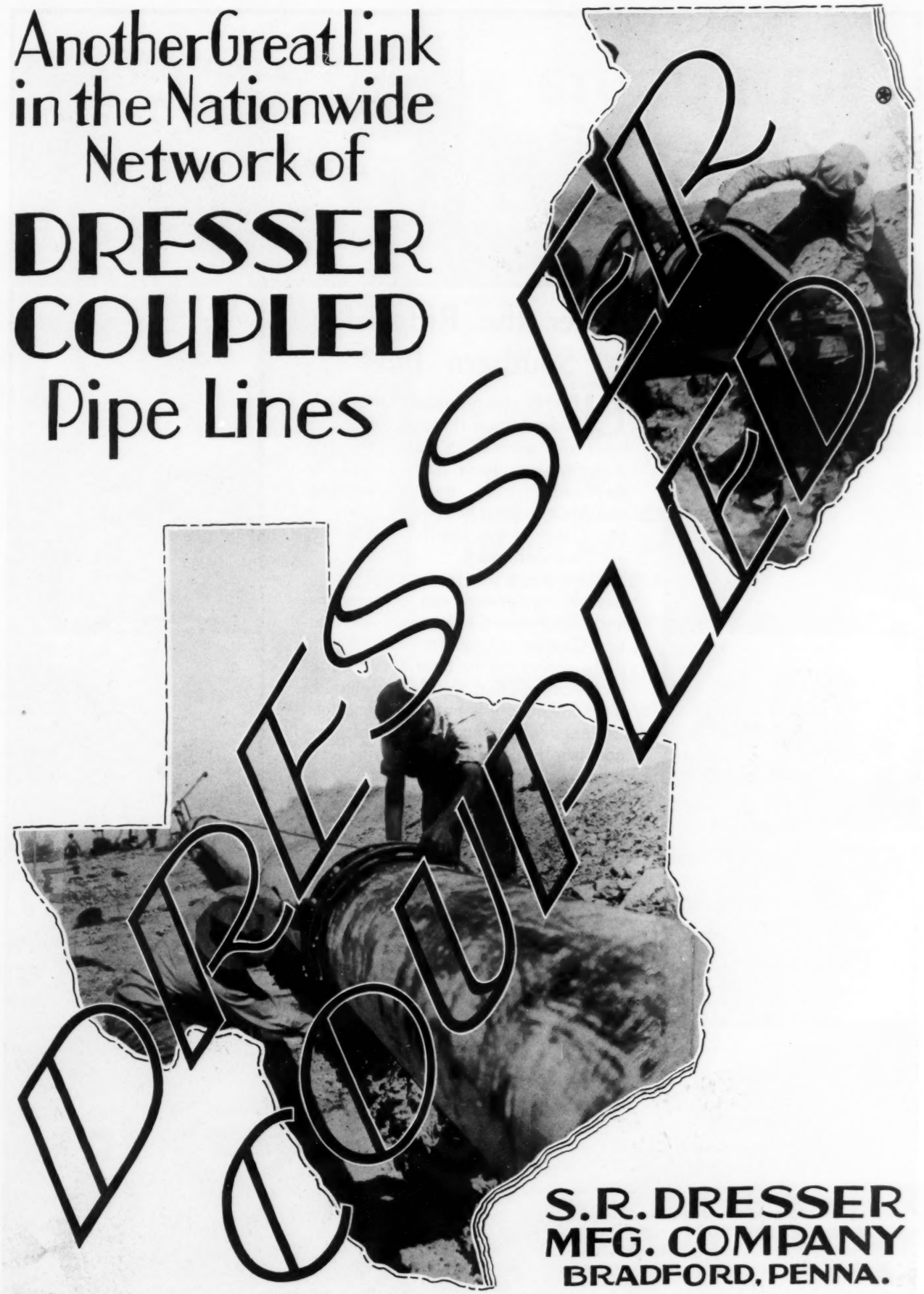

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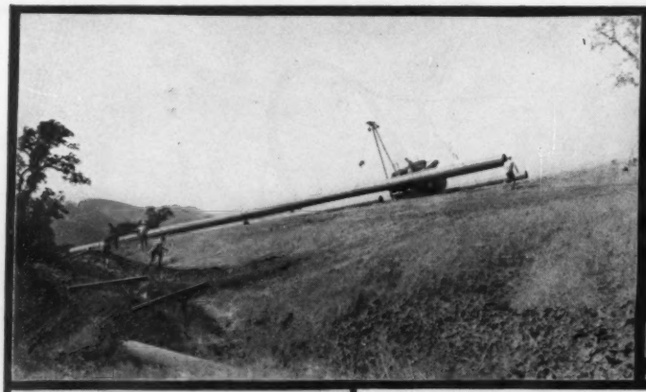

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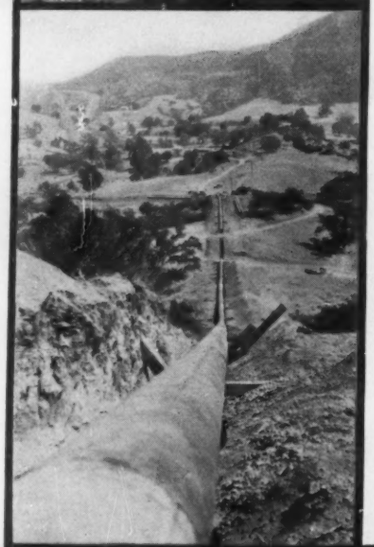

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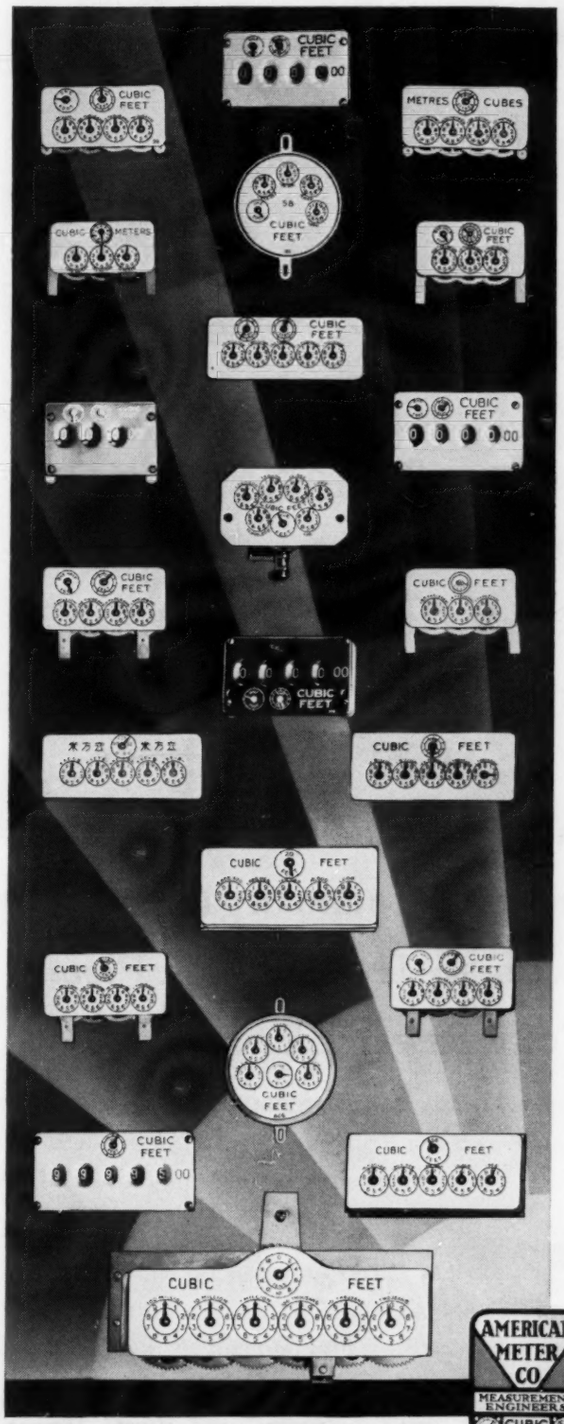

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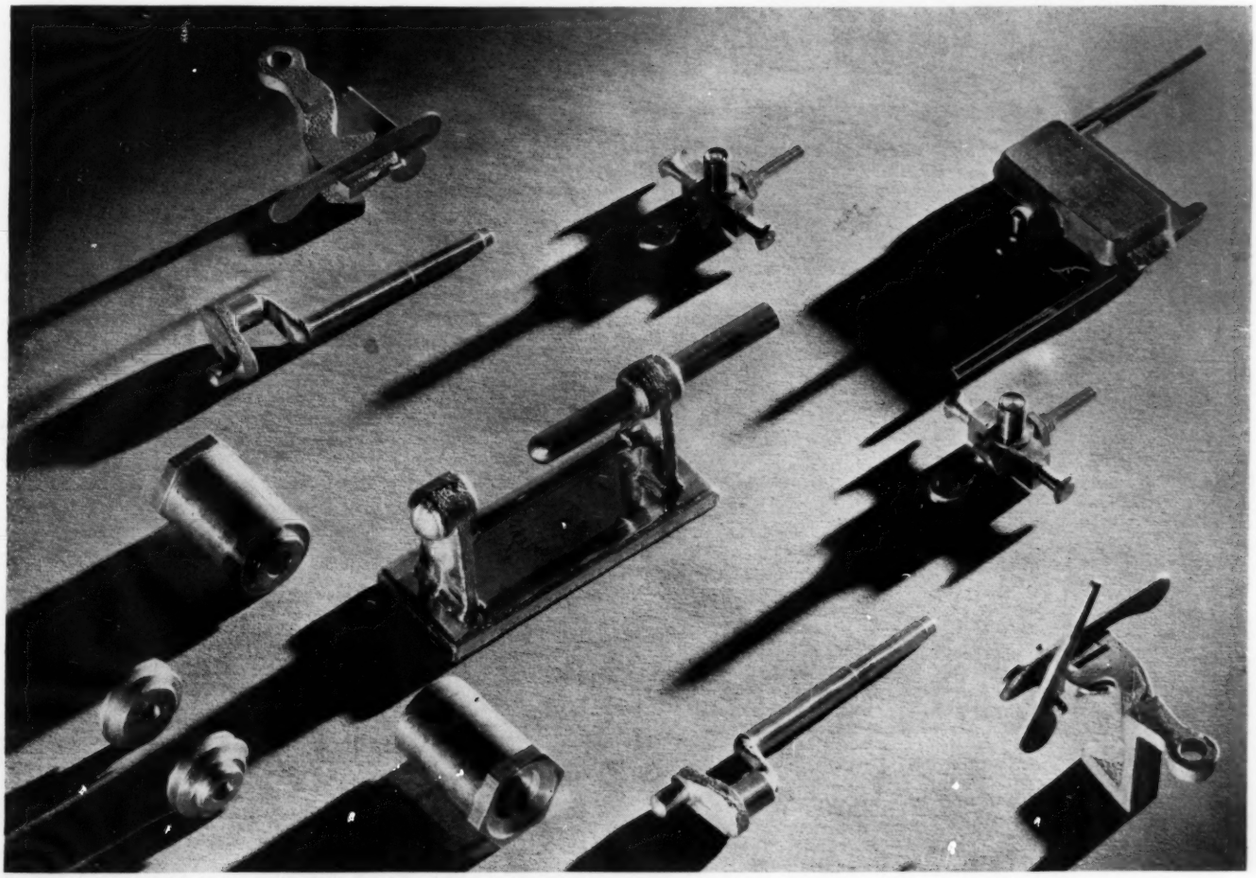

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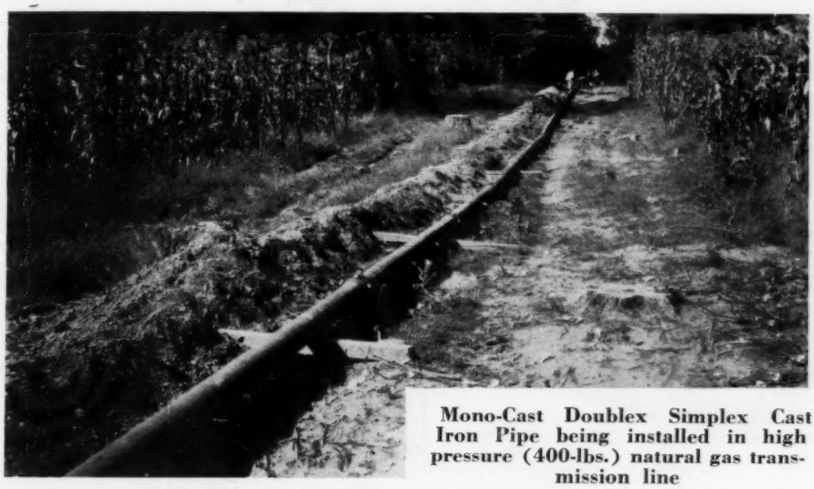
is now in service on 400 pounds natural gas transmission and up to 900 pounds in other services!



Mono-Cast Doublex Simplex Cast Iron Pipe being installed in high pressure (400-lbs.) natural gas transmission line

THIS cast iron pipe is made by the Mono-Cast centrifugal method and has a gland-packed joint. The superior quality of this product — its high strength — enables it to meet all demands for practical pipe line construction; strength in light weights, speed and economy in laying, and leakproofness under conditions demanding deflection, longitudinal expansion and contraction, and vibration. It is economical in first cost, and from the standpoint of resistance to corrosion it is in a field by itself. Its resistance is native—it doesn't require wrapping, coating or other artificial protection. Under widely varying conditions, Mono-Cast Doublex Simplex Cast Iron Pipe has definitely proven itself entirely satisfactory for use in high pressure gas and oil lines. Let us cite you this proof and quote you on your pipe requirements. Write nearest Acipco office for a complimentary copy of our catalog: "Mono-Cast Doublex Simplex Cast Iron Pipe."

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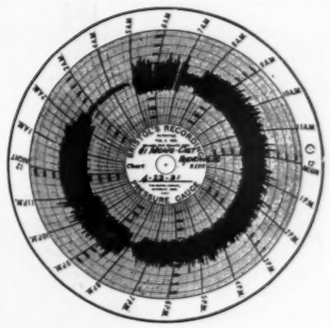
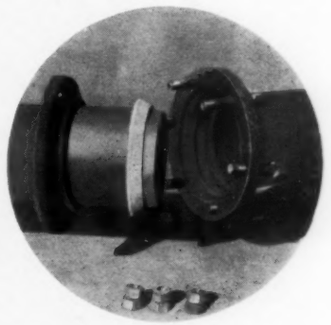
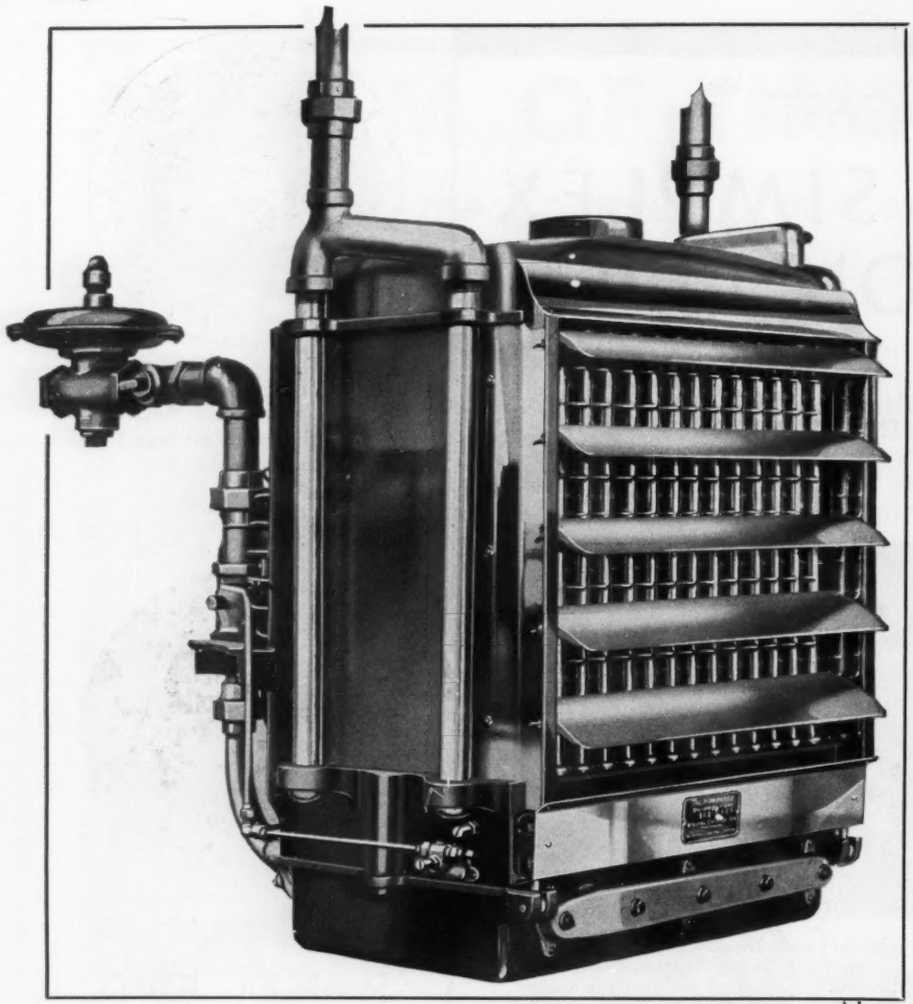


Test Chart showing 900 pounds pressure borne by Mono-Cast Doublex Simplex Cast Iron Pipe in a hydraulic line



The DOUBLEX SIMPLEX JOINT

When the plain end of a Doublex Simplex pipe is inserted in the socket, a triangular stuffing box is formed with a shoulder against which a gasket is compressed by the gland as the bolts are tightened. A very definite "seat" inside the socket acts to confine the gasket, resulting in maximum compression area which grips the surfaces of the pipe and makes a bottle-tight joint, while the large cross-section of the gasket provides for ample deflection and longitudinal expansion and contraction in the line. Plain, duck-tipped, and lead-tipped rubber, also asbestos gaskets are available. The Doublex Simplex Pipe is so simple in its construction that it can be easily and correctly laid with unskilled labor. Only one tool—ratchet wrenches—is necessary to make up the joints.



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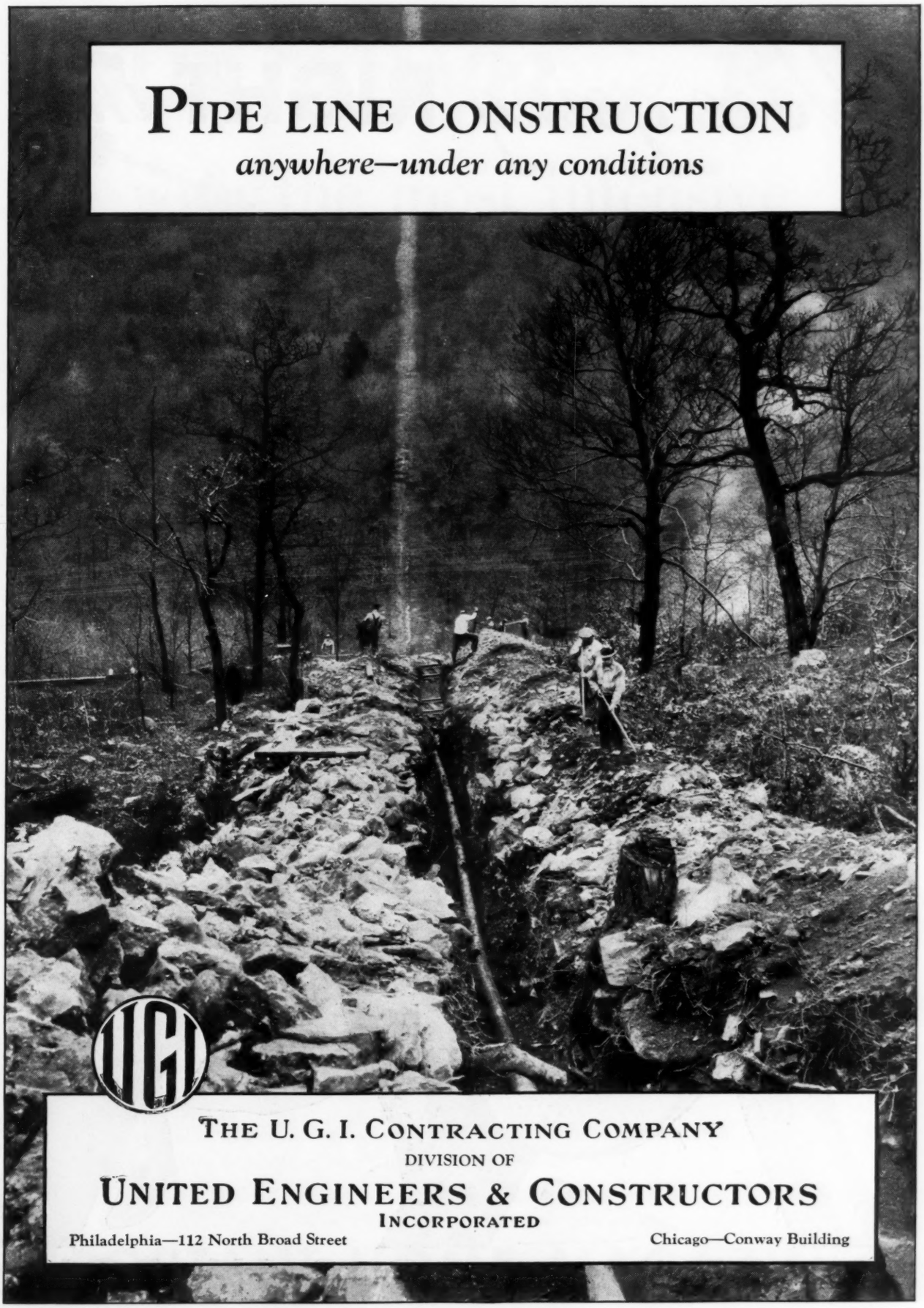

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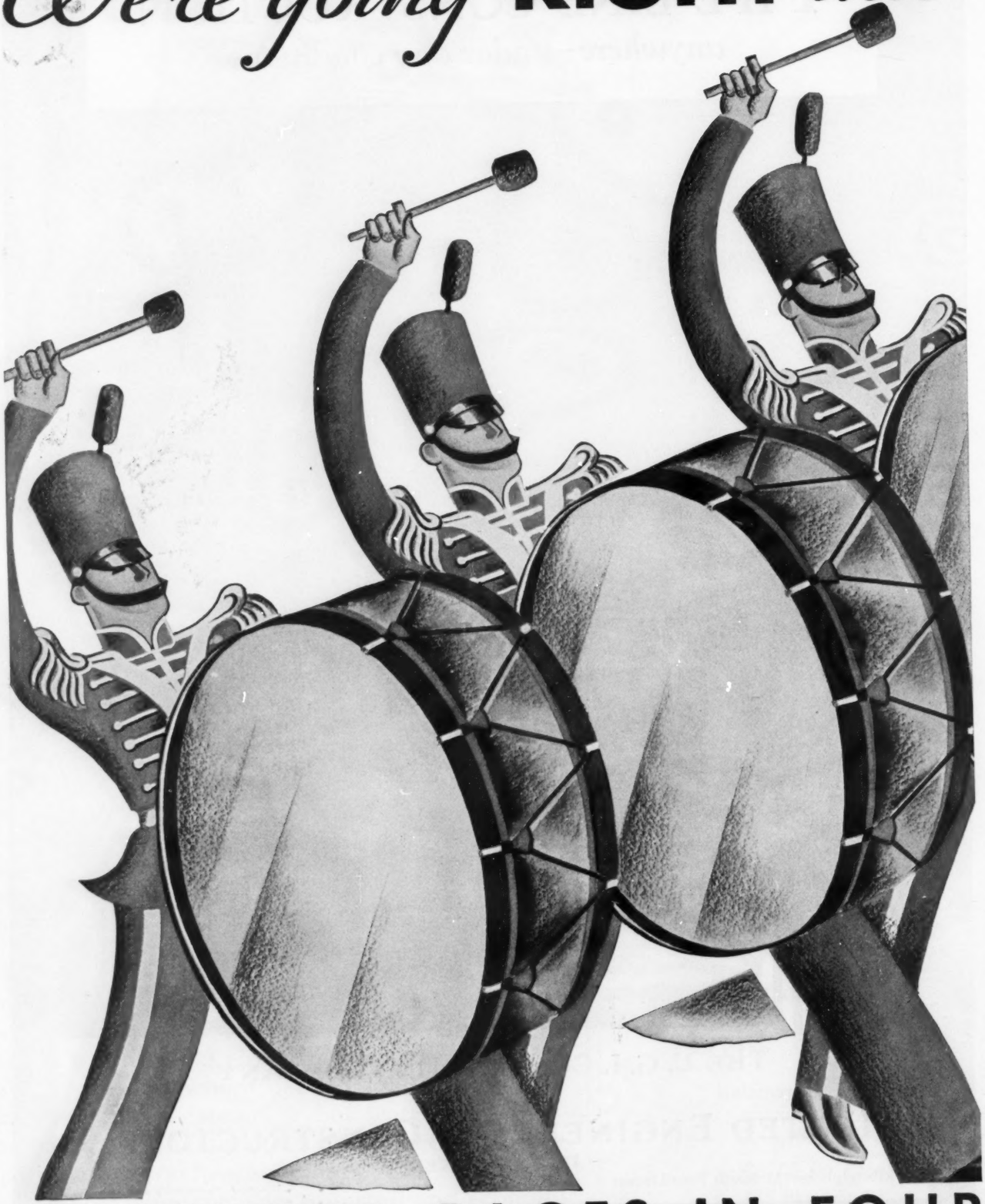

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Also, there will be full-page advertisements each month in INFLUENTIAL BUSINESS PAPERS . . . reaching the architects, builders and owners with whom you want to talk "gas refrigeration."

Let us help you follow up—capitalize—this barrage of Electrolux advertising this year. Get in touch at once with Electrolux Refrigerator Sales, Inc., Evansville, Ind.

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Procedure Controls for Lindewelding are available to all users of Linde Oxygen. If lighter costs and faster work would mean lower bids and more contracts for your company, ask our nearest district office for complete information today.

Motion Picture Shows details of Lindewelding

Lindewelding technique differs from neutral flame welding technique in that it employs a special rod, a special flame adjustment, and the "backhand" method of blowpipe manipulation. The actual steps in making a Lindewelded joint are shown in our motion picture, "The Lindeweld Process for Pipe Line Construction." This picture will be loaned free of charge to pipe line officials and welding or engineering societies. It is furnished in 16 mm. and 35 mm. safety film and can be obtained by writing to any Linde District Office.

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WESTERN GAS

"Reg. U. S. Pat. Off."

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THE PACIFIC COAST GAS ASSOCIATION

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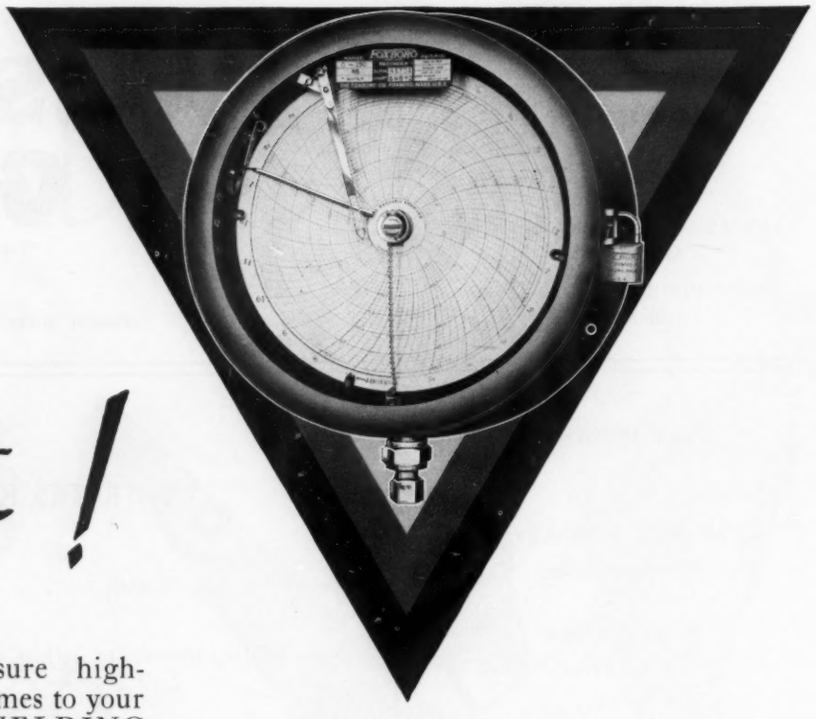
Safety First!



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January, 1932

WESTERN GAS

"Reg. U. S. Pat. Off."

Vol. VIII, No. 1

A Monthly Journal of the Gas and Gas Appliance Industries in *Western America*

Review of the Month

By-Products of Anti-Utility Merchandising Laws

LAWS preventing utility appliance selling, operative for several months past in Kansas and Oklahoma, may work temporary harm to the utility industry and general business in these states—but their results may supply exactly what is needed to effectually defeat future proposals of this brand when launched in other sections.

That the issue will be raised in many state legislatures at coming sessions is not to be doubted. Most recently affected is the Pacific Northwest, where two states report movements looking toward legislation to bar utility sales. By this time the utilities are surely alive to the fact that an organized agitation is being conducted. It may proceed from interests which sincerely believe that dealers will gain by prohibiting utility merchandising; or it may be inspired less openly by forces which seek to hamper efficient utility service, in the eventual interests of public ownership. Whatever the motives of its sponsors, the issue is the most pressing one before the utilities of the nation. And if there are some lessons to be learned from the Kansas-Oklahoma experience, the industry will do well to learn them quickly and put them to use.

When the utility sales organization of an entire state is cut down, it carries related structures in its fall. This simple economic cause-and-effect must be apparent to any one. Manufacturers and distributors of appliances are among the first to feel the burden. One gas appliance manufacturer, for example, already reports a loss of $200,000 annual business in Oklahoma and Kansas—lost gas company business which dealer sales have not replaced. A recent issue of "Electrical Merchandising" reviews an investigation among electrical retailers, wholesalers and power companies, with more facts of the same tenor developing. The review points out that in these states the anti-merchandising laws have brought a $4,000,000 loss in electric appliance sales by power companies, with no corresponding pick-up in dealer business; that this legislation has closed over 70 retail stores operated by power companies; thrown 200 salesmen into unemployment; increased service complaints in Kansas, where the law prohibits utilities from servicing equipment already sold.

No dealer move to hold up the appliance sales volume is noted; department stores are not adding to their appliance lines; few new dealers are established. Smaller communities and rural territory, in which utilities often were the only merchandisers, are particularly hurt, with the prediction that in these sections the demand market will be filled by the mail order house or chain stores operated by mail order houses. Inability to maintain appliance standards, promote load, or extend customer convenience, under these circumstances is apparent.

Both gas and electric appliance volume in lines of established demand has dropped; in promotional lines the situation is of course hopeless.

What the industry needs at this stage is an accurate and full picture of what is going on in Oklahoma and Kansas. To what extent are dealer sales decreasing? Will customer service suffer? Can the increased burden of sales promotion be carried at present rates? Is the law retarding general prosperity? Information thus far available, while it is necessarily scattered and incomplete, indicates that the Kansas-Oklahoma experiment is benefiting neither utilities and manufacturers, nor dealers—and that its consequences are not in the public interest.

Grounds for Optimism in 1932 Outlook

"Business conditions cannot help but improve during 1932. There is apparent, and has been for some time, a growing demand for necessary replacements, both of household equipment and otherwise, and this demand together with the growing development of central house-heating, air-conditioning, gas refrigeration and other distinctly modern uses for gas, is, I think, slowly crystallizing into action." In these words R. W. Gallagher, president of the American Gas Association, officially introduces 1932 with a spirit of optimism. Those who have followed the statistical position of the gas industry, with reference to general industry, during the past two years, will share President Gallagher's optimistic viewpoint. Gas sales and earnings may have been off somewhat more than fractionally, but 1931 will still go down as a year of accomplishment. Manufactured gas sales declined 2.5 per cent from 1930. Natural gas sales dropped 2 per cent in the domestic-commercial classification; 15 per cent in the industrial. On the credit side, manufactured gas househeating sales jumped 20 per cent; natural gas added $300,000,000 to its investment in long distance transmission facilities. An aggressive attitude, particularly on the sales front, sends the industry into 1932 with confidence.

AT LEFT:

One of the graduating classes from the adjuster's school of the Peoples Gas Light and Coke Co. The men are fitted with new uniforms and have been instructed in their duties. The "faculty" of the school, recruited from the company's operating and technical divisions, appears in the background.

By WILLIAM G. RUDD

Vice-President in Charge of Operations
Peoples Gas, Light and Coke Company

Nine Million

THE story of Chicago's change-over to mixed gas, because of the magnitude of the job, is bound to be outstanding. Nine million individual burners, scattered over 200 square miles, on a 4000-mile distribution system, gave the task extraordinary proportions.

By stepping up manufactured gas pressures the Chicago system was prepared for manufactured and natural gas in advance of the mixed gas introduction.

The industry has been awaiting a report on this largest of change-over programs, and *Western Gas* feels privileged to offer the following resume by William G. Rudd, vice-president in charge of operations for the Peoples Gas Light and Coke Company.—*Editor.*

THE Peoples Gas Light and Coke Co., of Chicago has practically completed adjustment of itself and its 900,000 customers to the change from 530 B.t.u. manufactured gas to a natural-and-manufactured mixed gas of 800 B.t.u. heating value. The new gas is approximately a 45-55 per cent blend of manufactured gas and natural gas, the latter supplied by the 1,000-mile 24-inch pipe line from the Texas Panhandle fields.

The change-over in the gas supply was begun at 4 o'clock on Friday afternoon, October 16. By Monday morning, October 19, the company's entire 3,735-mile distribution system was cleared of the old gas and saturated with the new.

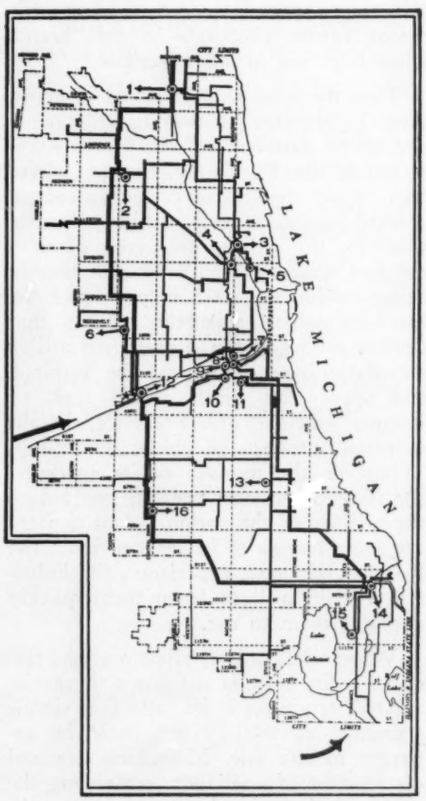
The elapsed time since then would seem to have been sufficient to develop all material consequences of the change-over, in customer-relations or otherwise. On this assumption the results, in general and in detail, appear to be highly satisfactory.

Even so, it does not necessarily follow that the Chicago change-over method would work equally well everywhere else. After all is said and done, the individual local problem—the particular local circumstances—should control the change-over method.

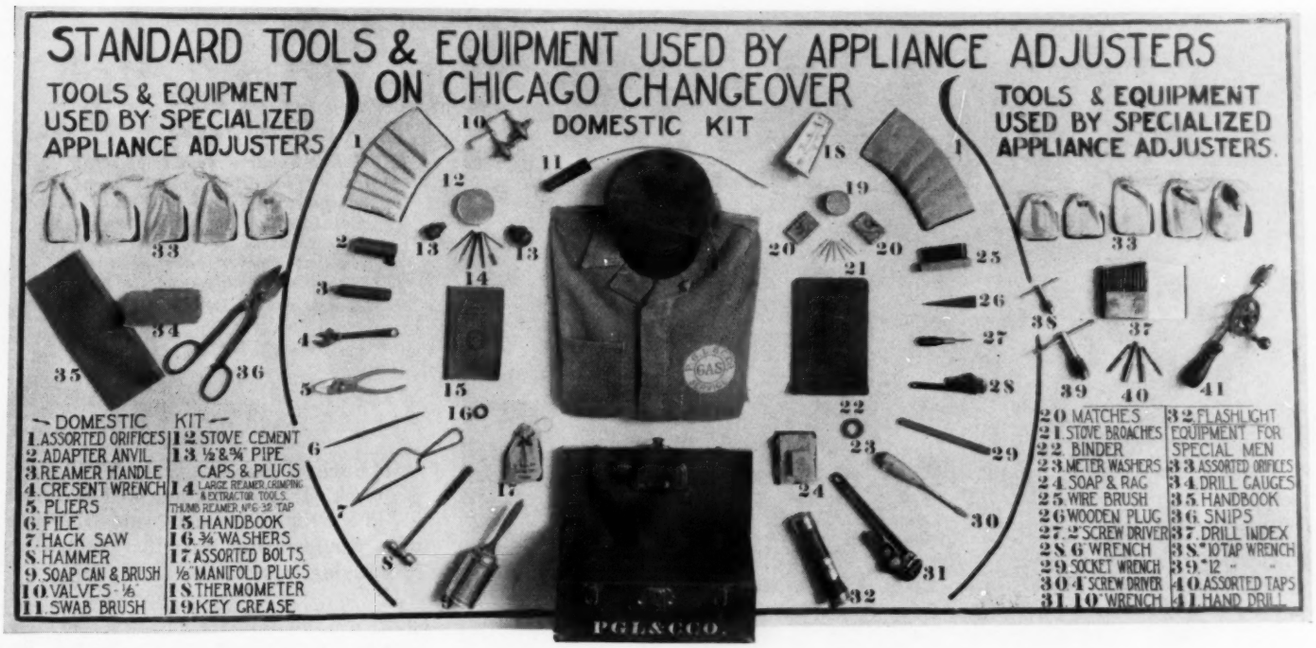
Careful preparation was, of course, a factor in the apparent success of the Chicago change-over. Months of study and experiment, test after test to explore every predictable possibility of error, preceded inauguration of the change-over program.

Engineers and operating men of The Peoples company were sent to study at first hand the methods followed in other cities where changes analagous to that impending in Chicago had recently been made. In general they found that the changes in those other cities had been from a fairly low B.t.u. gas to a straight natural gas of approximately 1,000 B.t.u. which was a much wider B.t.u. change than The Peoples company contemplated.

In some cities, the practice was to turn the natural gas into the distribution systems and then do a rush job of adjusting customers' appliances. Elsewhere, certain distribution areas were



The map above is a simplified chart of the gas manufacturing and distributing system of Peoples Gas Light and Coke Co. in Chicago. Lines shown are the backbone of the company's 3,375 mile distribution system.



Burners *to* Adjust . . . *and* How Peoples Company Did *the* Job

segregated and given natural gas one at a time, the appliance-adjustment following closely after the turn-on of the "natural."

While the latter method appeared to have certain advantages, it presented operating difficulties which were felt to be almost insurmountable in Chicago, with an area of 200 square miles, a distribution system of nearly 4,000 miles, and upwards of 9,000,000 individual burners, many of them antiquated, to be adjusted. The Peoples company therefore decided upon executing the general appliance-adjustment *before* turning the higher B.t.u. gas into the mains, although that had not been done in any of the cities studied.

PRESSURE CHANGE A FACTOR

It was known that if a certain B.t.u. gas is supplied to a burner, and the pressure is then raised, the effect at the burner is the same as if a higher B.t.u. gas were supplied at the original pressure. This fact was made the basis of the conversion and appliance-adjustment method adopted in Chicago.

Low pressure regulators in Chicago were being operated at 7 inches of water pressure with the 530 B.t.u. gas. Calculations indicated that raising the pressure to 9 inches with the 530 B.t.u. gas would result in the equivalent of the proposed 800 B.t.u. gas at the contemplated future pressure. Therefore, it was decided to proceed accordingly: raise the pressure to 9 inches, adjust the burners properly to 530 B.t.u. gas at that pressure, and then drop the pressure when the new 800 B.t.u. gas was turned into the mains. This was feasible within the pressure limits prescribed by the Illinois Commerce Commission which has jurisdiction over gas companies.

Then a fairly large-scale practical test was made to determine whether this treatment of pressures would work any hardship on the customer, even for the short time in which the pressure might be raised before the adjuster could reach the customer's premises. There was a section of the city, in which about 10,000 representative meters, actually in service, could be segregated for the test. Pressure there was stepped up to 9 inches and held at that point for a considerable period. No difficulty was experienced with appliances, and no complaints were received from customers.

APPLIANCE LABORATORY SET UP

To test the workings of the theory still more in detail, some hundreds of gas appliances of all descriptions were set up in the company's laboratory, including appliances of all conceivable condition in respect to age, neglect or efficiency. Natural gas was shipped direct from the Panhandle fields in tank cars, and mixed with manufactured gas to produce an 800 B.t.u. product for the test. An 800 B.t.u. product was also manufactured by using propane, which produced a gas similar to the proposed mixture of natural and manufactured gas.

The appliances set up in the laboratory were served with the regular 530 B.t.u. gas at ordinary street pressure. The pressure was then raised to 9 inches and the appliances were adjusted to burn properly at that pressure. Then the 800 B.t.u. gas was turned in, without any further adjustment, and was found to work perfectly.

Several advantages of the conversion

137 VARIETIES REPRESENTING 3036 OF THE INDUSTRIAL TORCHES REPLACED ON CHICAGO CHANGEOVER TO 800 B.T.U. GAS
5 DIFFERENT SIZE TORCHES USED TO REPLACE OLD STYLE TORCH

AT LEFT:

A few hundred pounds of scrap iron — industrial gas burning equipment replaced by The Peoples company for its customers. Note that the 137 former varieties of torches have been replaced with only five different new torches.

system used by The Peoples company are worthy of consideration:

1. It involved no disturbance or change in the operation of the widely interconnected general distribution system, with the resultant hazard of poor service or no gas supply; no changes except the re-setting of the automatic governors which control street pressures.

2. Pressures could be raised in band areas across the city—by governor-districts—just ahead of the crews of conversion-adjustment workers, much as a barrage is laid by the artillery ahead of the infantry in war. The adjusters could begin working on the customers' appliances immediately after the pressure was raised.

4. This method also permitted the use of a smaller, more select, and more easily handled corps of adjusters (although for longer period), because the work could be done without hurry during the months preceding the introduction of the new gas. It also permitted re-adjustments where necessary, for the better satisfaction of customers.

ADJUSTERS CAREFULLY TRAINED

On April 15, the company opened a a training school for appliance adjusters, with a "faculty" of experienced gas service operating men. Prospective adjusters were carefully selected—"hand-picked" to assure the highest practicable grade of intelligence and performance.

Initial instruction in the fundamentals of customer relationship was given them before the actual technical instruction. Intensive training in practical adjustment was then carried on, under competent supervision, in "class rooms" fitted with every imaginable gas-burning appliance likely to be encountered in the change-over, from the combination gas and coal range used in the early nineteen hundreds, down to the most modern appliances.

In these small laboratories, an instructor could demonstrate to a group of men, and then have them do the work themselves under his guidance. Each instruction room was supplied with gas through two separate systems, one carrying the 530 B.t.u. manufactured product at 9 inches pressure, thus duplicating the actual conditions to be met in the field, and the other carrying an 800 B.t.u. gas at 5.3 inches pressure.

The school had a capacity of 500 men per week. It gave training to 1,806 men in The Peoples company and 677 men who would work for other companies in outlying towns.

ADJUSTMENT EQUIPMENT

After finishing the course of instruction, each adjuster was equipped with a photographic identification card, a distinctive and duplication-proof uniform, his tools, and special report-forms or "tickets."

These "tickets" when filled out and turned in, carried the necessary information for checking the adjuster's work, and a report on the type and condition of each customer's appliances. This "census" of appliances is expected to be of value to the company in future operations and it also served in correcting the names and addresses of customers.

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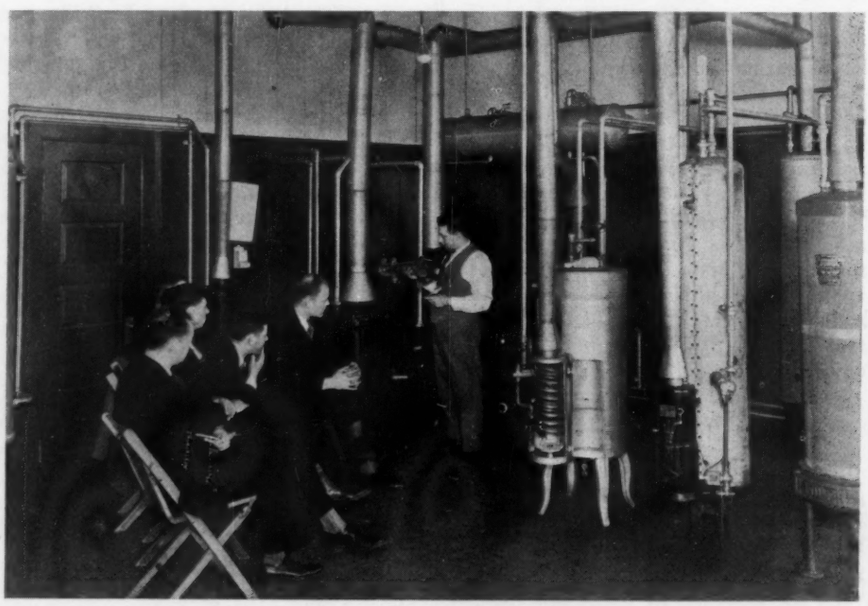

Teaching by actual demonstration—a class of embryo adjusters in one of the laboratories where the adjustment of water heaters is being demonstrated. A thorough course in both theory and practice was given all adjusters.

Gas Applied *to* Citrus Protection

By E. B. MOREY

Industrial Sales Engineer
Southern Counties Gas Company

CITRUS growers throughout southern California, interested in developing more efficient and profitable methods of preparing and protecting their products for marketing, have followed the progress of a new experiment recently completed successfully in one of the largest packing plants of the state. The experiment included the testing of new automatic gas-fired heating equipment which reduces the cost of waxing fruit 80 per cent under the previous method employed.

Blue mold decay, one of the greatest menaces encountered in shipping and marketing citrus fruits, has been checked completely since the discovery that a thorough washing in a warm solution of borax and the application of a thin layer of wax, frees citrus fruit from blue mold and eliminates any danger from further attack during shipment. The discovery of the two processes eliminated a 5 to 15 per cent loss previously taken on every shipment from blue mold, beside affording the shippers a real saving by retarding shrinkage. Another advantage obtained by this system is the high polish on the fruit, a distinct asset in marketing. One of the greatest forward steps ever taken in the citrus industry was made with the adoption of the new method of fruit protection.

Packing houses in southern California have used the washing and waxing process for several years, but have been unable to thoroughly perfect the operation until the recent application of a new type of automatic heating equipment. Previous to the development of the new equipment, electric elements were used to heat the wax and the interior of the waxing box. A fixed temperature of 220 degrees, which was highly desirable, could not be maintained with the electric equipment. In addition, a serious fire hazard was created by the proximity of the vaporous wax to the hot elements. Engineers experimented with several

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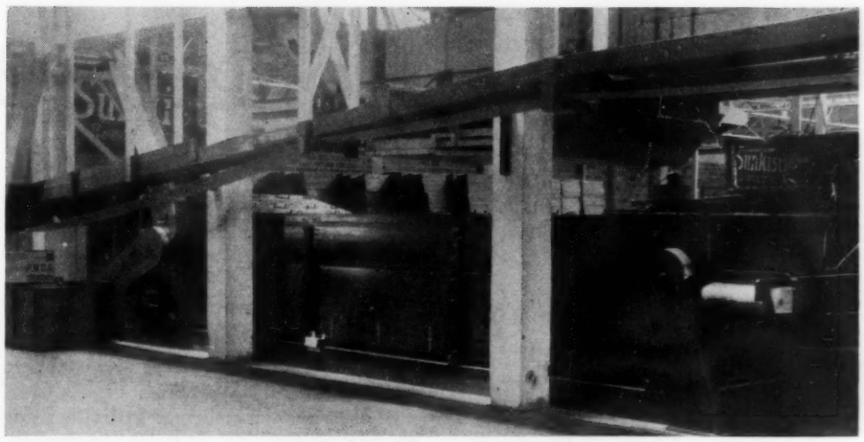
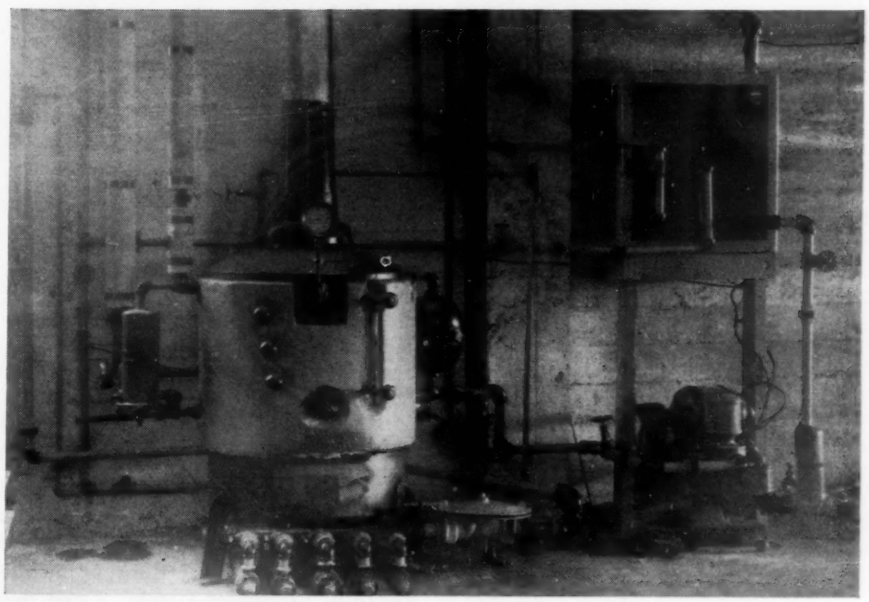
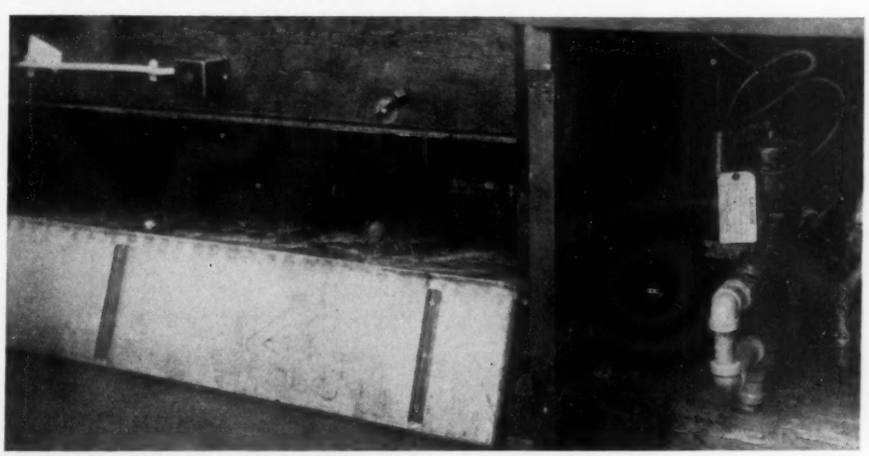
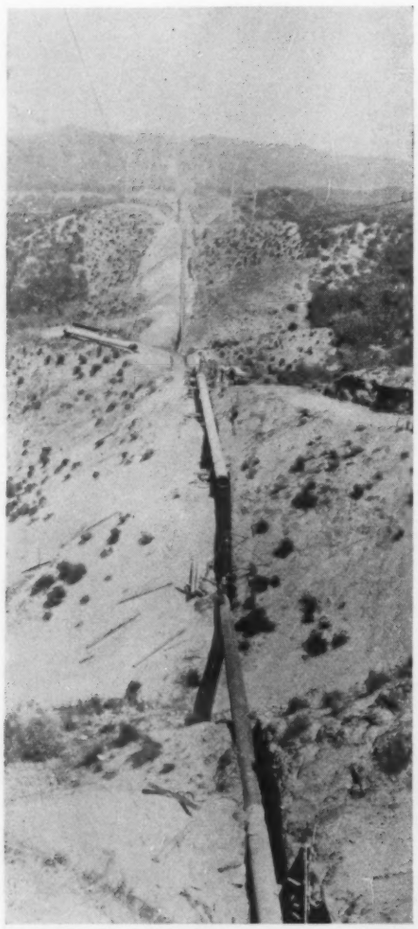


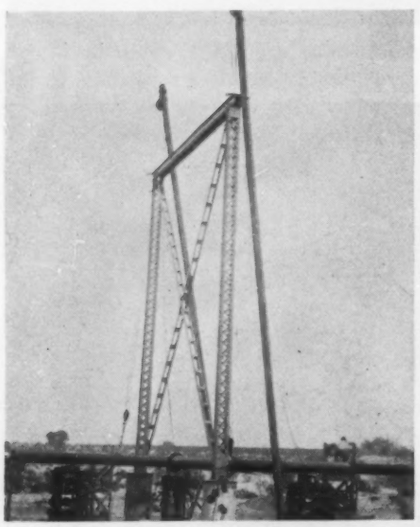




Upper: Side View of waxing box.
Center: Small steam boiler with automatic attachments for fruit waxing box.
Lower: Side door open, showing copper fin radiation in waxing box under brushes, also thermostatically controlled steam valve installation at end of box.



SECTION 3 of the Southern Fuel Co. project "over the Ridge" between Grapevine and Castaic was a stern test for crews laying the 26-inch line. The view above is typical of the terrain traversed.



ONE OF THE SPECIAL construction jobs was the suspension span across the Big Tujunga Wash, near San Fernando, Calif. The view above shows gin poles used in raising tower to position. In the center view the cable anchor at west end of the suspension span is shown, while in the view at right appears a 20-inch expansion loop below center pier. (Diagrams on opposite page give detail of suspension span design.)

Longest 26-in. Line Goes *into* Service

By H. P. GEORGE
Chief Engineer
Southern Fuel Company

EARLY in the year 1931, the Southern Fuel Co. undertook to construct a 26-inch O. D. steel pipe line from Kettleman Hills to Long Beach; about 207.7 miles in length. This company is jointly controlled by Southern California Edison Co. and Pacific Lighting Co. The pipe line was designed to provide an adequate supply of gas for use by the Southern California Edison Co. in its steam plant at Long Beach, and for the various gas distributing companies controlled by Pacific Lighting in Los Angeles and vicinity, and to have a capacity of 130 million cubic feet daily.

The character of the territory traversed by the line varies widely. Starting at the north end in a rugged section of Kettleman Hills, the course of the line soon passes southerly into a long stretch of level country of Kettleman Plains and Antelope Plain, past the Lost Hills and Belridge oil fields to, and across, the west end of the Elk Hills; thence to the east of the Midway Sunset oil field and across the southwest corner of the San Joaquin Valley to the foot of the mountain range between that valley and Southern California, at the mouth of Grapevine Creek. From this point, for a distance of 40.5 miles, the line follows the same course as the 22-inch line laid in 1930 by Southern California Gas Co. across rugged mountains between Grapevine and Castaic; thence along the electric transmission line of Southern California Edison Co. across the Castaic Valley, the upper end of the Santa Clara Valley to Newhall, and on to the Southern Pacific railroad right-of-way near Sylmar; thence parallel to Southern Pacific railroad to Glendale.

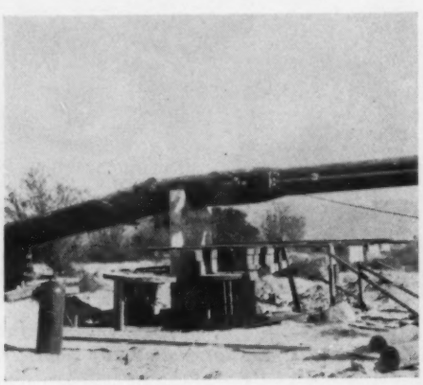
H. P. George

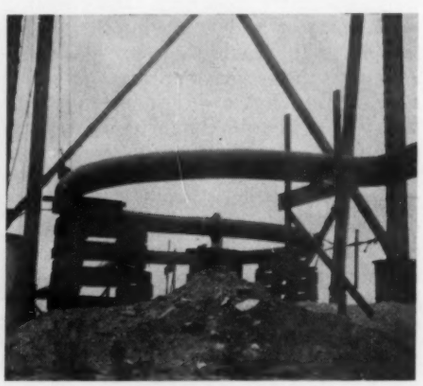
From Glendale the route follows largely along congested streets of Glendale, the Boyle Heights district of Los Angeles City and County, continuing southerly parallel to Union Pacific railroad right-of-way through South Gate, Lynwood, Compton, and finally terminating at Long Beach, at the plant of the Southern California Edison Co.

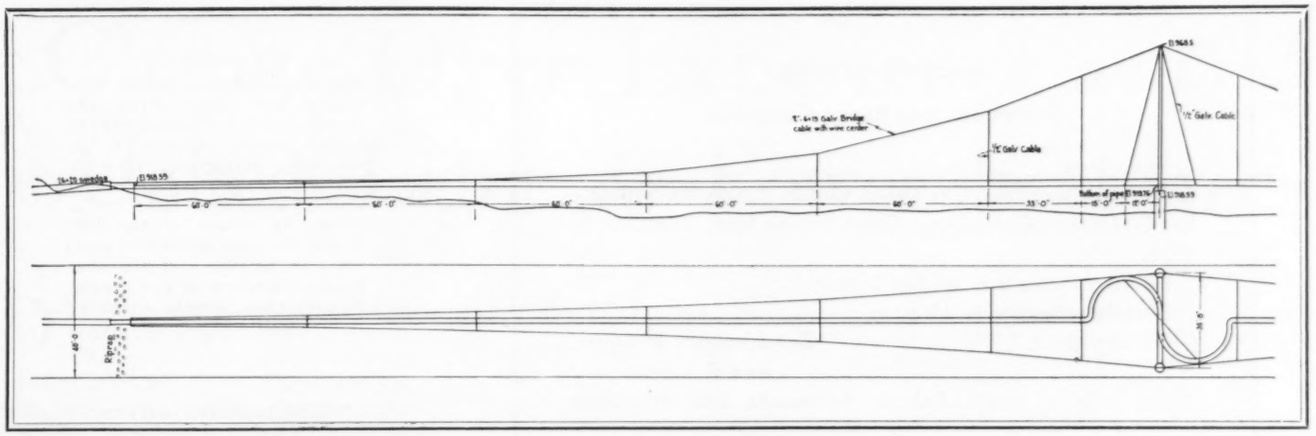
The gathering system in Kettleman Hills field, consisting of composite pipe line 4 miles in length and made up of 12-inch, 20-inch and 22-inch diameter pipe was laid early in the spring of 1931, by Southern California Construction Co. The field joints in this part of the line were made by the oxy-acetylene welding process.

The general contract for the section from Kettleman Hills to Grapevine—104.6 miles in length—was let to Macco-Robertson Co., Ltd. This is a solid electrically welded 26-inch line with H. C. Price Co. doing the welding.

The section across the mountains—40.5 miles long—was oxy-acetylene







ABOVE IS SHOWN plan of elevation for pipe line suspension across Big Tujunga Wash. Line was suspended by hangers directly attached to flanges welded to pipe. At right appears plan of center pier. Tower deflection is taken on 4-inch pin-hinged base.

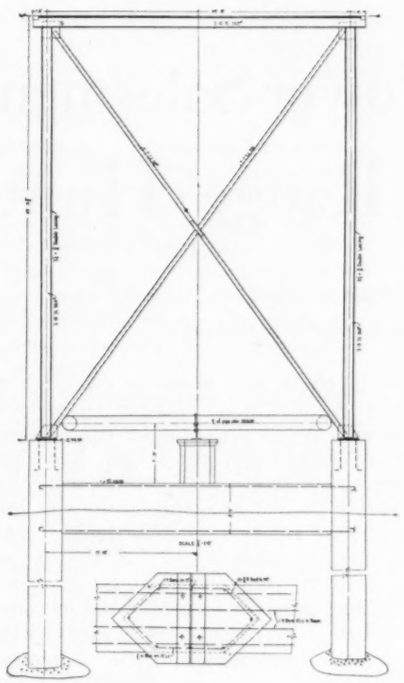
welded under contract with Southern California Construction Co. and Lang Transportation Co. From Castaic to Glendale the line was laid by Macco-Robertson Co. This firm welded 14.8 miles with the oxy-acetylene process, and H. C. Price electrically welded 16 miles.

From Glendale to Long Beach—a distance of 31.8 miles—the general contract was let to Lindgren & Swinerton, and was electrically welded by A. O. Smith Corp. Three miles in the City of Glendale was laid by Southern Fuel Co.'s own forces and welded by A. O. Smith Corp.

The project also includes one mile of 20-inch steel line, and a submarine crossing of 800 feet of 16-inch cast iron line at the Long Beach end.

Hauling

The distribution of pipe, valves and fittings, pipe protective coatings, etc., was handled by local trucking contractors, with the following firms the successful bidders on various sections of the job: White Truck and Transfer Co., Asbury Transportation Co., Allen Brothers, Inc., Lang Transportation Co., and Belyea Truck Co.



Departure from the usual procedure in stringing pipe was made along the Southern Pacific railroad right-of-way, where 16 miles of pipe were strung by work train and railroad crane.

Design

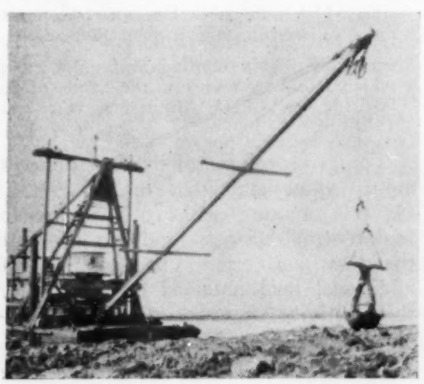
Considerable saving in steel was effected by designing a line having graduated wall thickness, starting at 5/16-inch and changing to 9/32-inch and finally 1/4-inch, as the pressure gradient declined. Provision was made in this plan for the addition of intermediate compressor stations as an increase in capacity of the line was required.

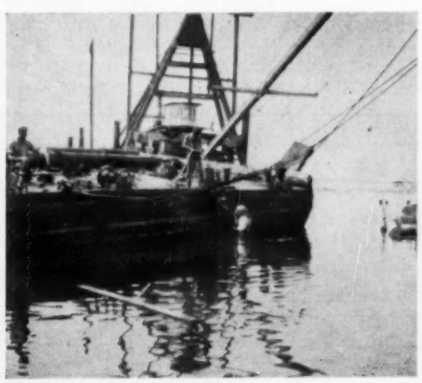
Except for the short section of cast iron pipe above referred to, all pipe was electric welded steel pipe with bell ends.

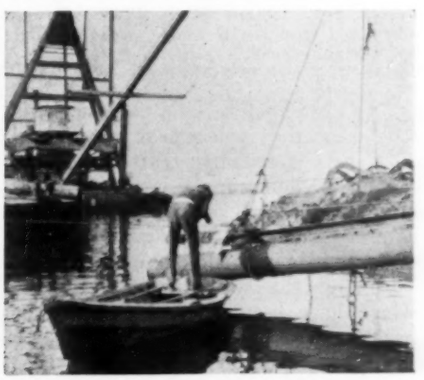
The Western Pipe & Steel Co. furnished 76 miles of 26-inch pipe made at their Los Angeles plant, in 30-foot lengths. Two lengths were electric welded together in the shop to produce

(Continued on Page 44)

ANOTHER CONSTRUCTION FEATURE on Southern Fuel line was the crossing at Cerritos Channel at the southern terminus of the carrier, of which three operations are shown below. At left is a dredge with clam shell bucket excavating for 16-inch cast iron line. A diver is shown in the center view leaving the tender to couple-up sections in trench at channel bed. Elevation minus 41 feet. Workman in view at right is taking soundings from row boat, preparatory to lowering pipe into trench.







HUNTING LICENSE

September Gas Range Campaign

This allows .....
to hunt and shoot for Gas Range Orders during the September Gas Range Campaign. Open Season Sept. 1 to Oct. 1, 1931.

Hunting Hours 8 a. m. to 12 noon.
Shooting Hours 6 to 10 p. m.
No Bag Limit.

Commissioner of Game and Gas Sales

Good only in North Dakota, Minnesota and Wisconsin

Lending atmosphere to its September gas range drive, the Northern States Power Company issued hunting licenses to its salesmen, authorizing them to "shoot" for gas range orders during campaign dates. The license is shown at the left. Prizes for sales accomplishments were in keeping with the same theme, consisting of pump guns, hunting coats, hunting knife and case, and the like.

North'n States Power Salesmen Bag Limits *in* Range Hunt

By LOUIS STEIN

Director of Gas Sales, Northern States Power Company

A FIRM belief that the gas industry must expend effort to retain the gas range load has prompted the Northern States Power Co. to carry on regular sales activity for both new and replacement range business. Indicating the important place given this activity in sales promotion, Mr. Stein has this to say of the range load:

"Nothing has happened even in recent months to in any way change the well substantiated fact that the average household is the structural unit forming the backbone of the gas industry in so far as the bulk of its earnings is concerned. For a long time, the earning ability alluded to has been basically found in application of gaseous fuel to the preparation of food at home."

Mr. Stein believes that no means should be neglected to encourage interest in home preparation of food. But no matter how well devised the educational program may be, it will go for naught if the housewife is utilizing antiquated equipment. Hence the need for regular, year-round effort on replacement business.

On this page is presented a brief description of one successful gas range activity conducted by Northern States Power Co., as abstracted from the December issue of "Bylesby Management."—*Editor.*

CONSISTENT with the belief that the replacement range business is an important force in retaining the domestic gas load, the Northern States Power Co.'s gas sales program carefully includes regular and consistent activities in this phase of sales work.

Among the several range activities which have been planned and fostered by this company is one which ran for the calendar month of September, 1931. Every effort was made to construct a program that was complete as to field activity, prospect development and associated sales helps, for which, like similar activities in other gas companies, a definite goal of accomplishment was set, otherwise tritely known as quota, based on doing business at the rate of four per cent of the domestic meters per year. For one calendar month, therefore, one-twelfth of four per cent was used, which numerically amounted to 164. After the smoke blew away, we found that the effort closed with 197 bona fide sales. Of this total, 115 were replacements, and the balance new business. The average selling price per range amounted to $82.69, the top figure of $112.67 being obtained at Grand Forks, North Dakota, and the low average of $58.52 at Eau Claire, Wisconsin.

The tabulation of results obtained against quota is shown in the following table:

NORTHERN STATES POWER COMPANY GAS RANGE CAMPAIGN, SEPTEMBER, 1931

Division	*Quota*	*Sales Made*
La Crosse	30	39
Fargo	28	29
Grand Forks	12	25
St. Cloud	14	25
Chippewa Falls	5	17
Red Wing	7	13
Winona	15	12
South St. Paul	7	11
Mankato	12	10
Faribault	10	8
Eau Claire	14	7
Stillwater	10	1
Total	164	197

Advertising consisted of a series of four newspaper ads, three-column, 10-inch, featuring the line of ranges handled by the company. A special mailing piece was prepared for prospects and for employees. The advertising department also prepared a special letter for non-users of gas as well as a special bill insert featuring a cabinet type range. Further sales aids consisted of cash bonuses for employee tips, as well as prizes for salesmen based on a campaign "stunt."

Louis Stein

The "stunt" consisted of a duck hunt competitively staged among the salesmen, and the "birds" shot numerically earned for each a competitive standing for prizes. To produce a hunting atmosphere, each salesman was issued a special hunting license, giving him permission to hunt and shoot for gas range business.

Prizes for successful hunters were awarded as follows:

First prize, a Winchester hammerless pump gun, to R. N. Wilson, La Crosse, Wisconsin, for shooting 29 birds.

Second prize was a Western double-barrel shotgun, awarded to J. Jerpbak, Grand Forks, North Dakota, for shooting 25 birds.

Third prize, a waterproof hunting coat, was awarded to O. Huseboe, Fargo, North Dakota, who shot 19 birds.

Fourth prize was a Winchester single-shot rifle, which went to G. Peterson, Chippewa Falls, Wisconsin, who bagged 17 birds.

Fifth prize was a hunting knife and case, which found its way into the hands of R. Speiring, St. Cloud, Minnesota, who had 15 birds.

The gross volume of business done in money value amounted to $16,291.57. Of this amount, $10,176 was due to replacement business and $6,115 due to new business. The amount of additional load obtained as a result of this activity is estimated at 1,230,000 cubic feet per year, all of which, of course, is cooking and baking.

Change-Over Experience *on the* United Light & Power System

By O. K. SMITH

The United Light & Power Engineering & Construction Company
Davenport, Iowa

PROGRAMS for the annual Meter Short Course and Conference conducted at Ames, Iowa, by the Midwest Gas Association and Engineering Extension Service of Iowa State College, have always been of great value to gas men of the Mid-West area. With natural gas gaining a larger foothold in that section, recent sessions of the Short Course have been supplemented with papers on various change-over and distribution system problems. Several papers of this nature rounded out the 11th annual conference program, held December 8-11 at Ames.

O. K. Smith of the United Light & Power Engineering & Construction Co., in his paper published in these pages, analyses the change-over procedure which has been developed for use on the United Light & Power system. Change-over to natural gas is now in progress at many of the company's Iowa-Nebraska properties.—*Editor.*

DURING the summer of 1930, when the United Light & Power Co. was first confronted with the problem of changing to natural gas distribution, considerable thought was given to the method of change-over.

It was believed that an intermediate step in increasing the heat units would be more advantageous and economical than to use the method of sectionalizing. To determine the possibility of this procedure, the writer carried out certain experiments on various gas mixtures at our plant in York, Nebraska, where natural gas was already available. The primary object of these experiments was to determine what percentage mixture of natural with manufactured gas would allow the customers to use their appliances with little inconvenience until the change-over men could reach them; also to then be able to adjust the appliances to a low hard flame so that when 100 per cent natural was turned into the lines that the burners would be in correct adjustment for this increased B.t.u. In using a 550 B.t.u. manufactured gas and 1050 B.t.u. natural gas a 40 per cent mixture of the latter was found desirable. This gave a mixed gas of approximately 750 B.t.u. for preliminary distribution. Since then we have used this method of change-over at all plants converted to natural gas.

Industrial-Commercial Survey

As a preliminary measure, it is advisable to make a systematic survey of at least all industrial and commercial consumers, and anticipate as far as possible the needed equipment necessary to convert their appliances to successful operation on natural gas. For the domestic appliances such as ranges, hot plates, water heaters, etc., there should be an oversupply of adapters, orifices and spuds on hand previous to the time of change-over.

It is now common practice to conduct a school previous to the time of change-over to instruct the adjusting crew in the technique of appliance adjustment. In arranging a "set-up" for this school it is well to include all of the different types of equipment that it is possible to obtain. These should be attached to a large manifold into which it is possible to admit straight manufactured, natural or a mixture of the two gases. The latter is controlled through regulators and the finer adjustment made from results of the calorimeter B.t.u. determinations. In preparing this equipment for the school, manufactured gas is first turned into the line and one burner adjusted properly for manufactured gas. This is then tagged "not to be disturbed." Natural gas is then turned into the line and another burner adjusted properly for this gas, and likewise tagged "not to be disturbed." When a mixed gas of 750 B.t.u. is then turned in the line it gives the employee a picture in the first case of what he can expect to find at the customer's appliances after the "mix" has been turned into the mains, and in the second case, of the quality of flame he should work to in having an adjustment which will be potentially correct when 100 per cent natural gas is turned on. The employee then practices adjusting the remaining burners to this quality of flame. The success of this method of adjusting and the further necessity of making a second adjustment lies in the careful work of the change-over men and their ability to retain a mental picture of this low hard flame.

Operating on Mixed Gas

During the period in which the mixed gas is being distributed, it is usually necessary to make a number of temporary connections. Carburetted water gas of the former quality is manufactured and delivered to the relief holder in the usual manner. In pumping this to the storage holder, however, it is necessary to do so at a very constant rate. It has been general practice in manufactured water gas plants to have at least one auxiliary exhauster motor driven. If this is not the case it is necessary to make a temporary connection to a constant speed motor for the period of change-over. A temporary natural gas line is tapped into the main, preferably in front of the purifiers to insure perfect mixing of the gases. A regulator is installed in this line, cutting the pressure to from 5 to 10 lbs. The quantity of gas then passing into the main is controlled by an ordinary gate valve. With the manufactured gas being pumped at a constant rate, it is a simple matter to control the quality of mixed gas by setting an ordinary gate valve to conform with B.t.u. determinations. These are made at constant intervals during the pumping periods, and the man delegated to make the calorimeter tests also controls the natural gas inlet valve. The B.t.u. of the gas leaving the storage holder is watched very carefully at the start to note the gradual increase in heat units being distributed. This period varies over quite a range depending on the size of the city sendout, etc., but the complete mix is usually into the mains in a period of 36 hours. All industrial and commercial services are carefully watched from the time the mixing is started, and temporary adjustments made when necessary.

When the full mix is through the mains, the change-over crews start on regular schedule. All commercial appliances are adjusted first, and secondly on to the residence districts. The men are

(Continued on Page 48)

Name

Address

Class—Cust.

Range—Kind—Type

Water Heater—Kind—Type

Furnace or Heating Stove—Kind—Type

Radiant Fire—Size—Make Fireplace

Incinerator Clothes Dryer

Hot Plate Laundry Stove

Refrigerator—Kind

Miscellaneous

Remarks:

Form used by Spokane Gas & Fuel Co., Spokane, Wash., for survey.

What *is* Our Market

Market Analysis and Surveys Give the Answer

By A. P. STRYKER

*Pacific Gas and Electric Company**

THE outstanding commercial problem in the industry today is adding of profitable load to the company's load at a minimum cost.

That we have to spend money to accomplish this is such an obvious fact that there is no necessity to discuss it here. Our discussion, therefore, will be devoted to "how and where."

It is generally conceded that the money spent should be in proportion to the value of the business to be secured, but the big problem confronting the utility is "What is the market potentiality?"

The sales manager of a utility is continually asking himself this question: "How can I add desirable load on my company's lines at the minimum cost, and in what field of application should my efforts be directed?"

This is the crux of the whole situation—how to find out the profitable field in which to work. It is the first step in market analysis.

The things we want to find out are:

1. What is the potential market for each appliance?

2. What type of community and class of consumers have we to deal with?

3. The index of their buying power or ability to purchase.

4. What are the general economic conditions in the community—growth—employment situation — new building, etc.

5. What are the climatic conditions? Do they lend themselves to the heating field or load?

6. What are all the competitive conditions affecting our business in a given territory?

About the only practical way to get the information as to the potential market is through surveys. This may be done by men specially assigned to this work or by the service crews handling the complaints and inspection work. Obviously, the first method is the best and most accurate. It is faster and does not include duplications that would be bound to creep in if the data were based on information secured by the service crews.

It is not necessary to secure a complete picture of all consumers to get information that is workable. If a company can secure a cross section of from 10 to 20 per cent of the given community, it is good workable information and will be fairly indicative of what the territory as a whole would show.

Care should be taken to see that the survey represents a composite of the whole community—not just the best class territory or the poorest.

The type of community and class of people are important items to be considered. What is the standard of living? Do the people normally buy luxuries and comfort or are they ekeing out an existence with the bare necessities of life. All of this has a very important bearing on the probable success of any sales plan which may be developed. This information is readily obtainable from the company representatives in the local community.

*Extracts from a report submitted to the 1931 annual convention of the Pacific Coast Gas Association. Mr. Stryker conducted a study for the P.C.G.A. Commercial Section on Market Analysis and Survey in 1931.

TABLE NO. 1

Type of territory	Suburban; residential
Number of consumers	15,074
Average class of consumers	Businessmen
Employment situation	Good
Economic conditions	Good
Average income per family	$3,500
Future possibilities for growth	Good; fairly rapid
Principal competitive fuel	Coal
Average cost of competitive fuel *vs.* gas	Coal, $17.50; Gas (cooking), $1.10; (heating), 75c

		% Gas Saturation on Survey	% Gas Saturation 18 mos. after Survey
Cooking			
Cabinet Ranges	10,704		
H. P. & Cookers	3,175	92.2%	94.7%
Wood, Coal & Oil	1,359		
Electric	103		
Water Heating			
Automatic	4,111		
Tanks & Comb.	7,148	74.8%	86.4%
Other fuel	840		
Electric	47		
Central Furnaces and Boilers			
Gas	895		
Wood and coal	2,943	5.9%	17.3%
Oil	590		
No central heating	9,866		
Ind. Room Heaters			
Gas	1,196	7.9%	15.9%
Other fuel	2,249		
Fireplaces			
Gas	82	.5%	2.4%
Other fuel	2,515		

Potential?

603914 6-30-10M.

PACIFIC GAS AND ELECTRIC COMPANY

Type Bldg. (Circle Which) Res. Flat Apt.

Meter No. Index

Attitude of consumer toward Company:

Friendly Unfriendly Unknown

Remarks:

First Call 1929 A.M. P.M.

Arrived A.M. P.M. Departed A.M. P.M.

Work Completed 1929

Report on Leak

Informed consumer regarding:

By Adjuster

Report Appliance Work on Reverse Side

APPLIANCE ADJUSTMENT AND SURVEY RECORD

COOKING: (Circle Which)

Gas Range	Hot Plate	Cooker	Wood or Coal	Comb. W C Gas	Elec.	Oil
Condition:	Good		Fair		Worn Out	

Adjustments:

Top Burners

Lighter Oven Pilot

Oven Burner

Min. Flame Oven Venting

WATER HEATER: (Circle Which)

Tank Htr.	Comb. Htr.	Auto Stg.	Auto Inst.	Range Coil	Furnace Coil	Elec.	Oil	Wood Coal
Condition:	Good			Fair		Worn Out		
Vented:	Yes	No	Proper Vent					

Adjustments

Pilot Light

CENTRAL HOUSE HEATING: (Circle Which)

Type:	Hot Air Furnace	Steam or Ht. Wtr.	None
Fuel:	Gas	Oil	Wood	Coal
Condition:	Good	Worn Out	Unsatisfactory
Venting (if Gas)	Good	Poor	Worn Out

Adjustments, if gas

Pilot Light

INDIVIDUAL ROOM HEATERS: (GAS)

No.	Type	Condition	Adjustments

Fire Place:	Wood	Coal	Gas	Stoves Coal	Stoves Wood

Remarks:

AT LEFT, front of survey form used by Pacific Gas and Electric Co., San Francisco, Calif. The back of the same form is shown above.

One very important item is the index of buying power. The appliances selected to be campaigned must have a selling price that is somewhat in proportion to the buying power of the community in which they are to be sold.

It would obviously be less successful to attempt to campaign an appliance selling for $200 or over in a community where the average income is only around $100 or $125 a month than an appliance more in keeping with the buying power of the community.

The information as to the buying power can be obtained from income tax reports, Chambers of Commerce or banks.

The general economic conditions—growth, employment, situation and new building—have a decided bearing on the intensiveness with which any campaign can be conducted. Naturally, in a community with fairly rapid growth, a steady employment situation, and a lot of new building, it would be much more profitable to intensify the selling activity than it would be in a community where the growth was rather lethargic and where employment fluctuates violently.

In the consideration of a selling program on gas heating, the climatic conditions have to be considered. Does the community have an all year around heating requirement or is it seasonal, creating high peaks for a short period? Some companies use the degree day basis to obtain this information.

Another factor which has to be considered is what type of heating equipment can most successfully be campaigned. In considering central furnaces, for example, how many of the houses in the community have basements? In some sections a comparatively small percentage of the houses have them, and this, of course, limits the possibility of sales of this type. In those cases more consideration has to be given to circulators, floor furnaces and similar types of equipment.

The success of a campaign on fireplace types of radiant type heaters is, necessarily, dependent upon the number of fireplaces that you have to work on.

One very vital point to be considered is the comparison of operating costs of gas *vs.* the competing fuel or fuels. This has a decided bearing upon the basis on which any campaign or sales plan would be launched; to whether economy would be stressed, or whether comfort, convenience and cleanliness would be stressed, with economy minimized. This has to be considered in the preparation

(Continued on Page 60)

When Competition Tightens, Improve

Industrial Sales *and* Service

By E. J. HATZENBUEHLER

Industrial Engineer
*Lone Star Gas Company**

HOLDING the industrial load during the present low competitive fuel prices is probably the most difficult industrial problem that has ever confronted gas companies. Low priced competitive fuels have threatened in the past, but never have their prices dropped to their present low levels. Statistics compiled by the American Gas Association comparing the first seven months of 1931 with the same period of 1930, show that gas deliveries have decreased approximately 16 per cent, with a decrease in gross revenue of approximately 20 per cent. This decrease may be attributed to general business conditions which have brought about the slowing up of manufacturing generally, and the replacement of natural gas fuel in industrial plants by coal and oil fuel.

E. J. Hatzenbuehler

Since the bulk of industrial gas sales in the Southwest is for boiler fuel, this paper will deal largely with boiler gas sales.

Cheap Oil

Fuel oil is probably the competitive fuel that is making the greatest inroad in the industrial business in the territory represented by this Conference. Due to the recent development of new oil fields, principal of which are the Oklahoma City pool and the East Texas pool, and the erection of numerous small topping plant refineries, fuel oil is being offered at prices ranging from 10 cents to 25 cents per barrel F.O.B. refineries, while the cost delivered to the industrial plant will vary from 38 cents per barrel to 90 cents per barrel, depending on the distance from the refinery. Instances have been known where residue and fuel oil has been given away and oil wastefully used about refineries in order to provide storage for incoming crude oil. The more gasoline and lubricating oils run the greater the amount of fuel oil and residue to dispose of, and with the demand for fuel oils below normal throughout the country, refineries are faced with the problem of disposing of fuel oil in order to continue operation. This fuel oil is principally 18° Be' and lower and flows freely at temperatures above 60° F. In some industrial plants it requires as much as 12 per cent of the total steam generated to handle this grade oil, but even though the expense of handling it is quite an item of firing costs, the low delivered price will permit those added expenses and still show a small margin of saving over natural gas cost in large plants, unless the gas price has been scaled down to compete with these low fuel oil prices.

Competition from Coal

Steam coals have also established new low prices. In addition to these low prices, coal companies in a number of territories are intensively pushing the sale of automatic stokers. These stokers are usually installed on a guaranteed saving basis, and payment for them is taken out of the saving they may effect. These stokers are sold on such long time trials and such easy payment plans that it appears as though the coal interests are satisfied to lend this equipment to their customers in order to insure a market for their product. They are not only endeavoring to place stokers in plants using natural gas as fuel but in plants using coal as well. Heating plants that normally used a high grade expensive coal are being solicited on the grounds that a stoker installation will effect a material saving, not only because of a higher firing efficiency but due to the fact that a cheaper, inferior grade of coal can be used. Regardless of the probable economic savings a stoker may effect, there still remain the coal dust, soot, and ash removal attendant upon coal firing, and operators who have enjoyed natural gas cleanlinness are loathe to make a change.

Practically all gas companies in the Southwest have lowered their industrial rates in an endeavor to hold their industrial business. These rate cuts vary from 10 to 25 per cent, and still they are unable to attract any appreciable amount of new business. Time after time they have, after offering cheaper rates, witnessed the oil companies shave their prices just enough to remain under gas costs. One or two of the major gas companies have based their new industrial rates on the price of fuel oil, with a fuel oil clause in their contracts adjusting the price of gas from month to month depending on the market price of fuel oil as quoted by trade publications. This type of contract is not unusual among the largest users, but I believe it is the first time the small and medium users of industrial gas have enjoyed such a contract. One of the above company's fuel oil clause reads as follows:

"Monthly bills for gas service rendered under this contract shall be decreased or increased, as the case may be, at the rate of one-sixth cent ($0.00167) per thousand cubic feet of gas delivered during the month for which bill is rendered, for each one cent ($0.01) per barrel decrease or increase from $1.00 per barrel in the sum of the quoted price, during the preceding month of..... fuel oil in.....lots plus an amount of .....per barrel for transportation, storage, handling and any other miscellaneous expenses incident to the transportation, selling and delivery of oil.

In no event, however, shall such decrease exceed five ($0.05) cents per thousand cubic feet or shall such increase exceed five ($0.05) cents per thousand cubic feet.

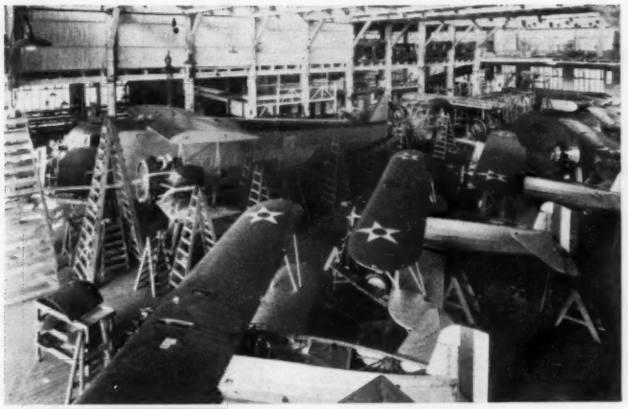
The quoted price per barrel of.....fuel oil in.....lots for each month shall be determined by calculating the arithmetical average of the daily quotation for.....fuel oil in.....lots, as shown in the daily Tulsa Edition of Platt's Oilgram, published by W. C. Platt Co. of Cleveland, Ohio, for the period between the 25th day of consecutive months."

This type rate is no doubt enabling this company to retain industrial business that would otherwise be lost, but in the territory served by the Lone Star System there apparently is no established market price for fuel oil, regardless of quotations furnished by trade publications. It has been our experience that even though fuel oil be quoted at 30c per barrel at refineries, there is an unusual amount of distress oil available at much cheaper prices.

(Continued on Page 46)

*Presented at the Second Southwest Natural Gas Sales Conference, Hot Springs, Ark., November 16-17, 1931.

AT RIGHT:
Assembling tri-motored transport planes and single-seated navy fighters at the Boeing Airplane Co. plant, Seattle, Wash., Gas fuel plays a leading part in heat treating processes at this aircraft factory.



BELOW:
Aluminum alloy heat treating department of the Boeing plant. Three gas-fired hot solution bath tanks maintain a potassium - sodium nitrate heating medium at temperatures of 940-950 degrees F.

Heat Treating Aluminum *by* Immersion Process

By J. B. NEALEY
American Gas Association

THERE are two distinct types of equipment for heat treating aluminum and its alloys including duralumin, and advantages are claimed by exponents of each. The first type is the regulation brick furnace; with this type the parts are placed directly in the heating chamber. The second type is a tank of hot liquid in which the parts are immersed. The heat treating technique including temperatures, heating periods, quenches, ageing, etc., are equally applicable in both types, as is also the use of gas, which is the most commonly used fuel in heat treating.

One of the world's largest airplane manufacturers, the Boeing Airplane Co. of Seattle, Wash., uses the immersion type of heat treating equipment. This concern, which is allied with the greatest air transport system extant, operating commercial passenger-mail lines from coast to coast and from Mexico to Canada, builds planes for some of the most important interests in the country as well as for the government itself.

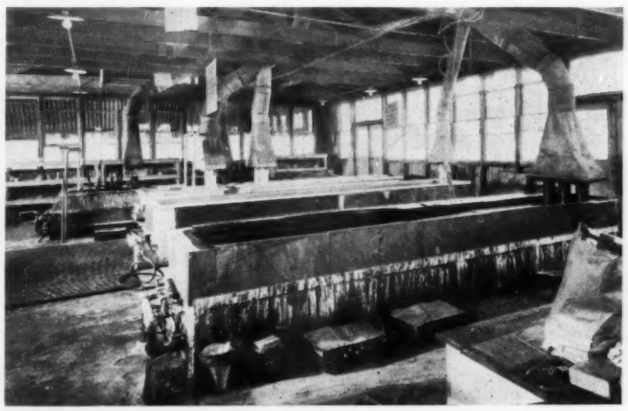
Several novel features, based on recent research, have been introduced among the heat treating practices in this company's plant. One of these is the temporary suspension of ageing in duralumin rivets after treating until they can be used. This is accomplished by putting the rivets directly from the quench into a refrigerator which is cooled with dry ice from plus 10 to minus 40 deg. F. Previous to this, small batches were treated from time to time throughout the day, but with the new practice enough can be treated each morning to last out the day, in fact several days. A considerable saving is thus effected not only in labor but in fuel consumption. Furthermore, this piece of heat treating equipment is free for uninterrupted service throughout the remainder of the day.

A large quantity of aluminum and aluminum alloy is used in the production of airplanes at the Boeing factory. Aluminum, dural and alclad are utilized extensively for surface covering, cowling, seats, flooring, tanks and other parts, as well as for structural, tubing and strutwork. All duralumin parts are heat treated for hardening and toughening in the sheet metal heat treating department, which adjoins the sheet metal division of the plant's large metal working unit.

This department is equipped with three hot solution bath tanks and each of these is paired with cold water tanks of similar size and construction. The heating medium in these tanks is a 50-50 solution of potassium and sodium nitrate which is kept at a temperature of 940-950 deg. F. One of these tanks is 16 feet long, 30 inches wide and 24 inches high inside, while the other two are of the same cross sectional dimension and 10 feet and 4 feet long respectively. Each of these tanks is heated with gas burners firing into pipes lying near the bottom. In two of these tanks there are three burners and pipes and in the other four.

One end of each pipe is welded into the end of the tank close to the bottom, the burner being outside of the tank and firing into the pipe. The other end of the pipe turns up and protrudes above the surface of the bath and all products of combustion are collected by a hood and ventilated to the atmosphere with an induced draft jet. Two of the quench tanks are heated with similar burners, the parts being quenched in cold water and then washed in the hot water. Each of the hot solution tanks has a thermocouple which is connected with a switch board and recording and indicating pyrometers.

The rivets are charged into steel pipes 4 feet long and 1½ inches in diameter, sealed at one end and open at the other, and these pipes are then set with closed end into one of the tanks, and left there for about half an hour. They are then removed and poured into a perforated dipper that is held under the surface of the cold water quench where they are allowed to remain for a few seconds and are then placed in containers and put into the refrigerator, from which they are removed as used.



Other parts, when treated, are kept in the hot solution for varying periods according to thickness, nine minutes being required for a part .0179 inches thick and 28 minutes for metal .2043 inches thick. A test piece from the same stock is always immersed with the parts and after being treated is sent to the laboratory for testing. Dural is expected to test 55,000 lbs. per sq. in. minimum, according to government specifications, and this is usually indicated by a

(Continued on Page 45)

Pacific Coast Gas Association

Managing Director: Clifford Johnstone

Association Headquarters: 447 Sutter St., San Francisco

President: Jas. L. Stone

Vice-President and Gen. Manager, Spokane Gas and Fuel Co.

Appliance Manufacturers Organize

PHILLIP O. Deitsch, Group Manager of the Manufacturer's Section of the American Gas Association, visited the Pacific Coast early in December and addressed meetings of manufacturers held in Los Angeles on December 1 and San Francisco on December 3. The purpose of Mr. Deitsch's visit was to explain to Pacific Coast manufacturers the broadened scope of the Manufacturer's Section of the American Gas Association, and to help them to take advantage of the several new services now being organized. As a result of these meetings the Pacific Coast group decided to form themselves into a Pacific Coast Division of the Manufacturer's Section, which would become affiliated with the Pacific Coast Gas Association, and be known as the Manufacturer's Section of the Pacific Coast Gas Association.

R. L. Hinckley, president of the General Water Heater Corp. was elected chairman of the Pacific Coast Division. H. W. Jackson, vice president and general manager of the James Graham Mfg. Co., was elected vice chairman.

In order to perfect details of the organization a representative committee was appointed, composed of R. L. Hinckley; H. W. Jackson; C. B. Babcock, of the General Gas Light Co.; W. J. Bailey, president of the Day and Night Water Heater Co., Ltd.; R. C. Hoyt, vice president of the Hoyt Heater Co.; D. P. O'Keefe of O'Keefe and Merritt Co.; Andrew Kerr, of Steiger & Kerr Stove & Foundry Co.; W. J. McLaughlin, of McLaughlin Sheet Metal Works; E. L. Payne, of Payne Furnace and Supply Co.; and J. M. Williams, of Williams Radiator Co.

A meeting of this organization committee was held on December 4, and it was determined that four divisions of the Manufacturer's Section would be organized immediately, with the following officers appointed by Mr. Hinckley:

Range Division: Andrew Kerr, Chairman; W. C. Gaffers, Vice Chairman.

Water Heater Division: R. C. Hoyt, Chairman; W. J. Bailey, Vice Chairman.

Space Heater Division: D. P. O'Keefe, Chairman; J. M. Williams, Vice Chairman.

Furnace and Boiler Division: E. L. Payne, Chairman; W. J. McLaughlin, Vice Chairman.

The form of organization suggested within the Pacific Coast Gas Association is that a Manufacturer's Section be formed which, while acting under the general supervision of the Board of Directors of the Association, will elect its own officers and be otherwise self-governed. To be a voting member of this Manufacturer's Section each manufacturing concern must be a member of both the American Gas Association and the Pacific Coast Gas Association, although membership in the Pacific Coast Gas Association will not be required of firms who merely wish to sit in at the meetings. The requirements for Class B Membership in the Association will be restricted to Pacific Coast manufacturers. A new class of membership will be instituted, known as the Associate, or Class F membership, which will be open to Eastern manufacturers and their representatives. It is probable that amendments to the Association constitutional by-laws, making these changes in its organization, will be offered for approval at the Spokane convention.

Sales Conference—Tacoma—January 22

R. W. COBLENTZ, assistant general manager of the Washington Gas and Electric Co., and vice chairman of the Association's Commercial Section, announces that the annual Commercial Section meeting and Northwest Sales Conference will take place this year in Tacoma on January 22. This meeting will continue the tradition of informality which has made it so successful and valuable in the past. It will be preceded by a dinner meeting at the Tacoma Hotel on the evening of January 21, the attendance at the dinner being confined to managers and sales managers of gas companies. The dinner will be addressed by Albert E. Wormwood, president of the Furniture Dealers Association for the State of Washington, and will be followed by an informal discussion. The general meeting on January 22 will be held at the Tacoma Hotel, starting at 10:00 A.M., and concluding with a dinner meeting in the evening. The general program for the conference follows:

JANUARY 21—7:00 P. M.

Managers and Sales Managers Dinner—Tacoma Hotel. Informal discussion managerial problems, including dealer cooperation.

JANUARY 22—10:00 TO 12:00 A. M.

Greetings: C. Y. Bowers, general manager, Washington Gas & Electric Co., Tacoma, Wash.

Comments: Jas. L. Stone, president, Pacific Coast Gas Association, Spokane, Wash.

Factory Representatives will be given an opportunity to tell of their companies' plans for 1932.

2:00 TO 5:00 P. M.

Cooking Schools and Demonstrations: Miss Beatrice Strege, Seattle Gas Co., Seattle, Wash.

Water Heaters: "Comparative Cost of Gas vs. Electricity," M. C. Hancock, Washington Gas & Electric Co., Aberdeen, Wash.

"Flat Rate Water Heating": Jas. L. Stone, Spokane Gas & Fuel Co., Spokane, Wash.

Househeating:
"How We Have Succeeded in Building Up Gas Househeating Load," J. Fremont, British Columbia Electric Power & Gas Co., Vancouver, B. C.

"Gas vs. Oil": Mr. Simmons, Air Flue Furnace Co., Portland, Ore.

"Budget Plan of Paying": Ray Trowbridge, Seattle Gas Co., Seattle, Wash.

6:30 P. M. DINNER

Jas. L. Stone, President P.C.G.A., Toastmaster.

8:00 P. M.

The Therm Rate: J. Earl Jones, Seattle Gas Co., Seattle, Wash.

Carrying Charge on Merchandise Accounts: J. H. Hartog, Portland Gas & Coke Co., Portland, Ore.

Proceedings in Demand

It will be gratifying to members of the Association to know that over 600 members have signified their desire to

receive a copy of Volume 22 of the Proceedings. The gratification arises from the assurance that this hearty response gives us that the proceedings are valued highly as a reference book on the industry. The Proceedings form a continuous record of the progress of the gas industry on the Pacific Coast from 1893 to the present time, and while very few complete sets are in existence, those who are fortunate enough to possess a majority of the volumes, value them very highly. Volume 22 should be ready for mailing about the middle of January, and the printing has been limited to 700 copies. As stated on this page in December, no promise can be made to members applying for copies after December 20th.

39th Convention Date

At a meeting of the Board of Directors held in San Francisco early in December it was decided that the 39th annual convention of the Association will be held in Spokane, Wash., from August 23rd to 26th, inclusive, 1932. The selection of these dates makes it possible for California members to include the convention as a part of a vacation trip through the states of Oregon and Washington, which offer some of the most beautiful scenery and facilities for recreation to be found anywhere in America.

Los Angeles Mid-Winter Conference

The next general meeting of the Association will be the Mid-Winter Conference to be held in Los Angeles on February 17th and 18th. This conference will be a general meeting of all sections, affording not only opportunity for individual committees to meet and discuss their assignments, but also including a general session to be addressed by several of the leading men of the industry.

H. W. Edmund Assistant to Vice-President H. L. Farrar

Harvey W. Edmund has recently joined the staff of Standard Management and Operating Corp. as assistant to Vice-President H. L. Farrar, with headquarters in San Francisco.

Mr. Edmund was formerly commercial manager of the Western Gas and Electric Co., and more recently president of the Universal Heater Manufacturing Co. He will divide his efforts between merchandising and operating activities of the companies operated by Standard Management and Operating Corp., including Coast Counties Gas and Electric Co., Westside Natural Gas Co., Natural Gas Corp. of California, Natural Gas Corp. of Oregon, Natural Gas Corp. of Washington, and Coast Industrial Gas Co.

Committee Organization Program

Accounting Section:

C. D. Cushman, chairman of the Accounting Section, has announced the appointment of Ben H. Hoke, as vice chairman of this Section in the Northwest. The organization of accounting committees is proceeding rapidly, and the studies will include several new subjects in addition to the completion of a number of investigations still on this Section's calendar.

Commercial Section:

J. C. Gilbert, chairman of the Domestic Sales Committee, announces the appointment of R. D. Dygert, of the Pacific Gas and Electric Co., as chairman of a committee on employment sales education and cooperation. Mr. Dygert is now engaged in completing his organization.

Mr. Gilbert also has appointed Miss Beatrice Stege, director of home economics. Miss Stege will make close contact with the home service committee of the American Gas Association, and will enlist the cooperation of women engaged in home service work for Pacific Coast companies.

Technical Section:

W. F. Pape, chairman of the Committee on Servicing Special Installations, announces the following memberships on this committee: W. F. Brandt, Los Angeles Gas and Electric Corp.; A. E. Englebright, Pacific Gas and Electric Co.; W. A. Kohlhoff, Montana Power Co.; M. McMahon, Southern California Gas Co.; C. R. Miller, Portland Gas and Coke Co.; C. W. Whaling, San Diego Consolidated Gas and Electric Co.

Norman Hoff, chairman of the Distribution Design Committee, has added the following: R. E. Cole, Montana Power Co.; A. E. Englebright, Pacific Gas and Electric Co.; A. B. Meyer, Southern California Gas Co.; V. J. Lewy, Southern California Gas Co.

Wm. A. LaViolette, chairman of the Committee on Governors and Regulators, has appointed H. G. Andrews and Otto Boyd, both of the Southern California Gas Co., to membership on this committee.

D. E. Farmer, chairman of the Committee on Domestic Meters, has placed Otto Goldkamp of the San Diego Consolidated Gas and Electric Co., H. M. Crawford of Los Angeles Gas and Electric Corp., and F. H. Coble, of the Southern California Gas Co., on the committee.

O. L. Wrestler, chairman of the Committee on Pipe Protection, announces the following additions to his committee: A. B. Allyne, Southern Counties Gas Co.; M. T. Burton, Southern California Gas Co.; L. L. Biggs, Southern California Gas Co.; D. A. Hiskey, Southern California Gas Co.; W. R. Schneider, Pacific Gas and Electric Co.; R. C. Terradell, Los Angeles Gas and Electric Corp.

C. P. Johnson, chairman of the Production Committee, announces the formation of a committee on coke and briquette merchandising, headed by F. W. Smelts of the British Columbia Electric Power and Gas Co., as chairman.

The Production Committee will continue its work on the study of water gas, particularly in reference to the use of butane as an enriching medium. W. A. Alexander of the Seattle Gas Co., will continue as chairman of the Water Gas Committee.

R. A. Hoffman of the Spokane Gas and Fuel Co., will prepare a paper amplifying his description of last year on the production methods used by the Spokane company.

R. R. Blackburn, chairman of the Accident Prevention Committee, has added to membership on this committee F. S. Hornberger and J. S. Edwards, both of Southern California Gas Co.

Lower Gas Rates Announced for Vancouver, B. C.

Revised lower gas rates for Vancouver, B. C., have been accepted by the city council with adoption of the report of a special committee which negotiated the new schedule with the B. C. Electric Railway Co., Ltd., serving the city.

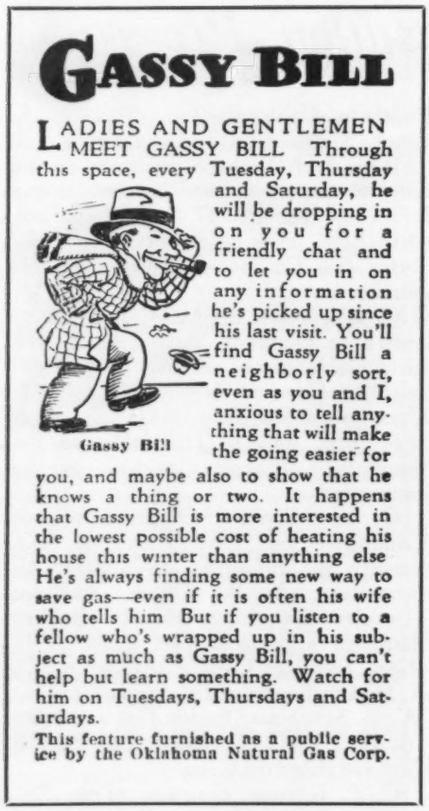
In the schedule meter rents of 25c a month are abolished and minimum charge for slot meters is reduced from 75c to 50c.

The new rates, which will go into effect shortly, provide for a charge of 50c for the first 100 cubic feet or less; $1.25 per M.c.f. for the next 900 cubic feet; $1.20 per M.c.f. for the next 19,000, and $1.15 per M.c.f. for the next 20,000.

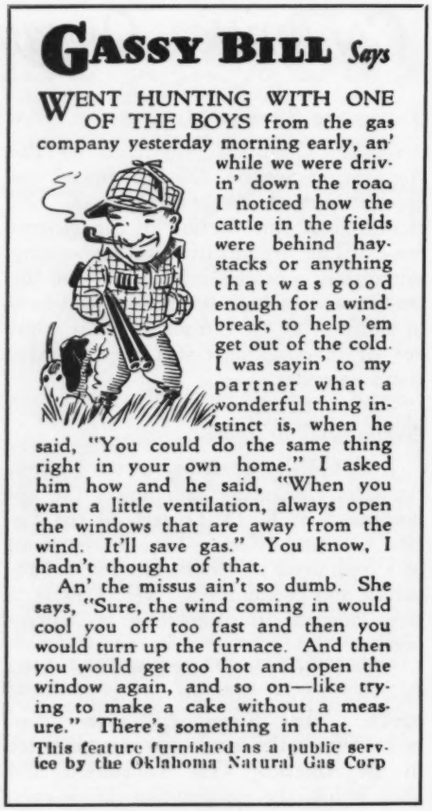
Existing gas rates are $1.40 for the first M.c.f.; $1.25 per M.c.f. for the next 4000; $1.20 per M.c.f. for the next 15,000, and $1.15 per M.c.f. for the next 20,000.

Under the new schedule the first thousand cubic feet will cost $1.62, compared with $1.40 under the old price. With the abolition of the meter rent, however, the net cost will be $1.37.

For users of 5,000 cubic feet per month the cost under the new schedule, minus meter rent, will be $6.42, while under the old schedule, with a 25-cent meter rent, the cost would have been $6.45.


GASSY BILL
LADIES AND GENTLEMEN MEET GASSY BILL Through this space, every Tuesday, Thursday and Saturday, he will be dropping in on you for a friendly chat and to let you in on any information he's picked up since his last visit. You'll find Gassy Bill a neighborly sort, even as you and I, anxious to tell anything that will make the going easier for you, and maybe also to show that he knows a thing or two. It happens that Gassy Bill is more interested in the lowest possible cost of heating his house this winter than anything else He's always finding some new way to save gas—even if it is often his wife who tells him But if you listen to a fellow who's wrapped up in his subject as much as Gassy Bill, you can't help but learn something. Watch for him on Tuesdays, Thursdays and Saturdays.
This feature furnished as a public service by the Oklahoma Natural Gas Corp.
Gassy Bill

Introducing the new character to gas consumers on Oklahoma Natural Gas Corp.'s system.


GASSY BILL Says
WENT HUNTING WITH ONE OF THE BOYS from the gas company yesterday morning early, an' while we were drivin' down the road I noticed how the cattle in the fields were behind haystacks or anything that was good enough for a windbreak, to help 'em get out of the cold. I was sayin' to my partner what a wonderful thing instinct is, when he said, "You could do the same thing right in your own home." I asked him how and he said, "When you want a little ventilation, always open the windows that are away from the wind. It'll save gas." You know, I hadn't thought of that.
An' the missus ain't so dumb. She says, "Sure, the wind coming in would cool you off too fast and then you would turn up the furnace. And then you would get too hot and open the window again, and so on—like trying to make a cake without a measure." There's something in that.
This feature furnished as a public service by the Oklahoma Natural Gas Corp

One of the advertisements appearing three times weekly in newspapers throughout the state.

Answering Consumer Complaints

OKLAHOMA Natural Gas Corp., Tulsa, Okla., has introduced an interesting character to its consumers through the medium of the daily papers. "Gassy Bill" is a feature appearing three times a week throughout the company's territory as paid advertising, in which all complaints received from consumers are answered in an interesting and explanatory way.

"Gassy Bill" is a character created by Oklahoma Natural's advertising staff, and typifies the "meddlesome" husband who comes home at night and starts poking into things. His wife is a paragon of patience and wisdom, explaining to Gassy Bill, and incidentally to Oklahoma Natural Gas Corp. customers, various reasons why bills are high, how to keep the house at the proper temperature, ways to keep the gas bill down, and other points of interest and value.

Lone Star Employees Meet in Company Get-Together

MORE than 300 employees, west Texas district representatives of the Lone Star Gas Co., the Community Natural Gas Co., the Stamford and Western Gas Co., and the Lone Star Gasoline Co., met with officials of the various companies at Eastland on December 11 to discuss cooperation between distribution company men and pipe line men.

Roy Moore, storekeeper of the West Texas district, welcomed the guests and introduced A. W. Breeland, safety director for the companies. Will C. Grant, public relations director, outlined the purposes of the gathering, and introduced Frank L. Chase, president of the Community Natural Gas Co. and vice-president and operating manager of the Lone Star Gas Co.

L. B. Denning, president of the Lone Star Gas Co., described briefly the value and necessity for a holding company such as the Lone Star Gas Corp.

Chester L. May, vice-president of the Community Natural Gas Co., talked on the present rate situation in Texas.

Music was furnished by the Lone Star band under the direction of A. J. Campbell, bandmaster.

C. M. Brewer Named President of Two Byllesby Companies

C. M. Brewer has been elected president of the California Oregon Power Co. and Mountain States Power Co. Mr. Brewer has been vice-president and general manager of the Mountain States Power Co. since 1919 and of the California Oregon Power Co. since 1929.

The office of president of both companies has been held by John J. O'Brien, who as president of Byllesby Engineering and Management Corp. and Standard Gas and Electric Co., has served also as president of most of the subsidiary and affiliated companies comprising the Standard Gas and Electric Co. system.

Announcement also is made of the election of M. D. Field as vice-president and treasurer, J. C. Boyle as vice-president in charge of operation, and Glenn L. Jackson as vice-president in charge of sales, of the California Oregon Power Co., and of W. L. Fitzpatrick, vice-president and treasurer, and Z. E. Merrill, vice-president in charge of operation, of Mountain States Power Co.

C. G. Spencer, Southern Counties District Mgr. at Pomona, Dies

CHARLES G. SPENCER, district manager of the Southern Counties Gas Co., at Pomona, Calif., died on December 15, as the result of wounds inflicted by a former meter reader of the company who had been discharged. Mr. Spencer and Ralph Hathaway, district chief clerk, were shot, Mr. Hathaway surviving. Mr. Spencer had been connected with the industry for the past 25 years.

On coming to southern California he became associated with the Southern California Edison Co. as gas engineer and was later made chief engineer of the company's plant at Santa Ana. In April, 1910, he was transferred to Long Beach and placed in charge of the company's plant there, and later was given the management of the Edison plant at Whittier, Calif. When Southern Counties Gas Co. purchased a number of gas properties in southern California including the Whittier system, Mr. Spencer remained in charge.

In 1916 he went to Pomona as district foreman, and in August, 1922, was made district manager there, remaining in that position until the time of his death.

A. G. A. Industrial Gas Sales Council to Meet January 15

THE Mid-West Industrial Gas Sales Council of the American Gas Association will meet Friday, January 15, 1932, at the Palmer House, Chicago, at 10 a.m. Program details have been formulated by a committee under C. F. Henness, chairman, and are as follows:

Business meeting and election of officers.

Discussion: "The Importance of Off-Peak Business in Pipe Line Operation," led by D. W. Chapman, manager industrial gas sales, Peoples Gas Light and Coke Co., Chicago.

Luncheon.

"Present and Future Problems Confronting the Industrial Gas Industry," by Mr. Henry Loebell, president, Surface Combustion Co.

Discussion: "Practical Solution of Gas Change-Over Problems," led by C. J. Levey, chief engineer, National Machine Works, Chicago.

General discussion.

Continental Construction Co. Applies for Permission to Construct Laterals

A hearing was scheduled to be held by the Iowa Public Service Commission, on December 22, on the application of the Continental Construction Corp., of Chicago, for permission to construct laterals from its main pipe line to Milo, Muscatine and Creston, Iowa.

Public Service Co. of Colo. Offering $11,000,000 in Bonds

Halsey, Stuart & Co., is offering $11,000,000 first mortgage and refunding six per cent gold bonds of the Public Service Company of Colorado, Denver, at 91, to yield 6.7 per cent. This is the company's first offering since 1924.

J. M. Stone Named Sec'y.-Treas. of Southern Gas Association

J. M. STONE, commercial manager of Alabama Natural Gas Corp. and affiliated companies in Mississippi, was elected to the office of secretary-treasurer of the Southern Gas Association, to take the place left vacant by the resignation of George Schlatter, who has been appointed to a sales post with the Electrolux Refrigerator Sales, Inc., of Evansville, Indiana.

J. M. Stone

Mr. Stone has been active in the merchandising end of the gas industry for several years. He was born in South Carolina, attending college in that state. In 1921 he moved to Atlanta, Ga., to take a position as salesman with the Georgia Power Co., where he remained for several years. He then joined the staff of the Birmingham Stove & Range Co. in Birmingham, Ala., as southern representative, and was with that company for two years when he accepted a position with the Estate Stove Co. in a similar capacity which he held until February, 1931, when he was made commercial manager of the Alabama and Mississippi Natural Gas Corporations.

Since becoming affiliated with that company Mr. Stone, as commercial manager of these properties, consisting of 19 towns scattered through the two states with approximately 7,000 meters, has put over several satisfactory campaigns, the most outstanding one being carried on last August, with a total of $62,000 worth of merchandise sold during that month. Mr. Stone possesses an extensive and thorough knowledge of gas appliances and methods of selling.

Mr. Schlatter joined the staff of the Electrolux Refrigerator Sales, Inc., following many years of experience in the industry, beginning in 1914. In September, 1923, he accepted a post with the Jacksonville Gas Co. as general sales manager, and in 1929 went to the Birmingham Gas Co., Birmingham, Ala., remaining in that post until joining the Electrolux organization. Mr. Schlatter held the post of secretary-treasurer of the Southern Gas Association from 1928 until 1931.

Continental Construction Corp. Now Natural Gas Pipe Line Co. of America

According to the New York press, the name of the Continental Construction Corp., Chicago, Ill., has been changed to the Natural Gas Pipe Line Co. of America. Capital stock of the company is also reported increased from 500,000 shares to 1,500,000 shares.

The new company will operate the Texas-to-Chicago carrier and affiliated projects, and will replace the Natural Gas Co. of America, which will be eliminated.

Cities Service Co., Middle West Utilities Co., Standard of New Jersey and the Texas Corp. control the company.

Granted Franchise for Service of Gas for Industrial Use

Kansas City Industrial Fuel Gas Co., Kansas City, Mo., was recently granted a franchise for the service of natural gas for industrial purposes in Kansas City, according to reports from the press. R. O. Baldwin is president of the company.

Springfield, Ill., Ready for Change Over

ILLINOIS Power Co., Springfield, Ill., expects to make natural gas available to its consumers about January 15, according to word received from A. D. Mackie, general manager for the company in that city. Supply will come through the 24-inch carrier of the Panhandle Illinois Pipe Line Co., subsidiary of Panhandle Eastern Pipe Line Co. This line passes Springfield, running east to Indiana, about 6 miles south of the city. The major line is tapped with a 16-inch extension running north to Peoria, at a point just east of Springfield, and this 16-inch line in turn is tapped at two points by a 10-inch line connecting into the system of the Illinois Power Co. in the northeast section, and a 10-inch tying in with the company's system in the southeast section of the city. The south line feeds directly into the company distribution system, while the north line feeds into the distribution system and to the company's holders.

Illinois Power Co. is constructing about 2 miles of 10-inch main from these two feeder lines, and is building two regulator stations and rehydration stations.

The company plans to sell straight natural gas of 1000 B.t.u.'s, using a mixed natural and manufactured gas of 780 B.t.u.'s for the change over, which Mr. Mackie expects will take about 10 days. There are about 17,000 meters on the company's system, and about 150 men will be used in adjusting appliance burners in the change over.

A temporary experimental schedule of rates will go into effect with the change in service to 1000 B.t.u. natural.

The therm method of billing will be employed. Following is a resume of the general domestic, residence water heating and space heating rates under the temporary set-up.

Regular Rate, Available for Any Consumer:

20c net or 21.5c gross per therm for the first 100 therms per month.

18c net or 19.5c gross per therm for the next 440 therms per month.

15c net or 16.5c gross per therm for the next 560 therms per month.

14c net or 15.5c gross per therm for the next 560 therms per month.

13c net or 14.5c gross per therm for the next 1130 therms per month.

12c net or 13.5c gross per therm for all over 2790 therms per month.

Discount:

Customer will be billed at the net rate, the gross rate will be charged if bills are not paid within 10 days from date of billing. The minimum bill will be 50 cents net per meter per month.

Optional residence water heating rates will vary from 20c net per therm for the first 30 hours use per month of active load to 9c net for all over 60 hours use per month of active load.

The space heating rate will be available for residence customers depending primarily on gas for space heating purposes, and will include a radiation charge of 1c per month per square foot of required radiation, payable on the first of each month, October to April inclusive, plus a charge for gas as follows:

20c net or 21.5c gross per therm—first 14 therms per month.

12c net or 13.5c gross per therm—next 14 therms per month.

5c net or 6.5c gross per therm—over 28 therms per month.

A correction for B.t.u.'s will be made if the average for the month is below 985.

Northern Gas and Pipe Line Co. Lets Contracts on Owatonna-Rochester Line

Contracts have been let by Northern Gas and Pipe Line Co., Omaha, Neb., to the Truman-Smith Construction Co. for a branch line to Rochester, Minn., from the terminus of the 16-inch main line west of Owatonna, Minn. The line will run directly east 45 miles, 12-inch line as far as Owatonna and 10-inch for the balance. At Rochester the municipal power plant will be supplied with gas as will the Franklin Heating Station which furnishes heat and power for the Mayo Clinic, Kahler Hotels and others.

Some tap lines are being built from the 16-inch main line in Minnesota to serve Wells, Alden and New Richland, while from the Rochester line Dodge Center and Kasson will be served. A distributing division of the Northern Natural Gas Company will distribute the gas in these five towns. Construction is well under way and is scheduled for completion in December.

Pensacola, Florida, Changes to Natural Gas Service

Change over to natural gas took place at Pensacola, Fla., on November 15, with Mayor H. Clay Armstrong turning the valve in the first regulator placed in service. Sam Brown, manager for the Florida Public Utilities Co., subsidiary to Central Public Service Corp., officiated at the ceremonies. W. W. Winter, division manager for the company, was a featured speaker. Approximately 3,200 meters were changed to the new fuel within a week.

Supply comes from the Yazoo City-Mobile line of the United Gas Public Service Co., Houston, Texas.

Illinois Power & Light Corp. Wants to Serve "Natural" in Jacksonville

Illinois Power & Light Corp., subsidiary of North American Light & Power Co., Chicago, has applied for permission to serve mixed natural and manufactured gas in Jacksonville, Ill., supply coming from the lines of the Panhandle Illinois Pipe Line Co. The company has also filed a new schedule of rates to become effective with the change over.

Harrington Is Industrial Engr. for Missouri P. & L. Co.

Missouri Power & Light Co., subsidiary of North American Light and Power Co., Chicago, Ill., announces the appointment of C. W. Harrington as industrial engineer for the natural gas properties of the company in Missouri. The company's Missouri headquarters are in the Board of Trade Building, Kansas City.

Southern Natural May Build Line to Chattanooga, Tenn.

According to report, the Southern Natural Gas Corp., Birmingham, Ala., is planning construction of an extension from its main line to Chattanooga, Tenn.

Seattle Gas Co. Leases New Quarters

SEATTLE Gas Company, Seattle, Wash., announces that it has signed a 20-year lease on a five-story building on Fourth Avenue near Pike Street, Seattle, the lease involving approximately one million dollars in rentals during the next 20 years. The lease was signed for the Seattle Gas Co. by James F. Pollard, general manager. The modernized structure will be known as the "Gasco" Building.

Work will be started immediately on reconstruction of the building to meet the needs of the gas company. Modernizing work will include the complete rebuilding of the front of the structure to make it into a modern office building with adequate light and visibility for all office and salesroom purposes.

The ground floor will be equipped with modern showrooms and the street will be faced with lighted windows equipped for the display of modern gas appliances. Adequate conveniences will be provided on this floor for all customer services, as well as generous floor space for the display of a full line of merchandise.

On completion of these changes, which will take about 60 days, the company will move immediately to its new quarters.

Under the terms of the lease, the Seattle Gas Co. will occupy the ground floor, the basement and two upper floors for office purposes. Total floor space to be occupied by the gas company is 25,964 square feet, which is more than twice the size of its present quarters.

Alterations to the building will be started immediately, according to Mr. Pollard. It is estimated they will involve expenditure of upwards of $95,000. At present there are 468 employees working for the company of which 190 will be housed directly in the building or work out of it as definite headquarters, such as meter readers, collectors and salesmen. It is estimated that the building remodeling will provide work for about 150 more during the reconstruction period.

Sioux Falls Changed to Natural Gas Dec. 3

SIOUX FALLS, S. D., was changed over to natural gas service on December 3, by the Sioux Falls Gas Co., following completion of a 16-inch line from Sioux City, Iowa, by Northern Gas and Pipe Line Co., Omaha, Neb.

Mayor George W. Burnside turned the valve which brought the new fuel into the city about five o'clock in the afternoon, at which time brief ceremonies were held.

About 100 adjusters began work at seven a.m., December 4, finishing the first section that day. The rest of the city was changed over in sections, there being five in all, work being completed by the first of the following week. There were 7,569 meters affected in the change to "natural," according to S. D. Whiteman, vice-president and general manager of the company, which is a subsidiary of the Associated Gas & Electric System.

Complete 3,750 H. P. Booster Station at Alto, La., For Four Companies

The Southern Natural Gas Corp., Mississippi River Fuel Corp., Southern Carbon Co. and Hope Producing Co. have recently brought to completion a 3,750 H.P. compressor station at Alto, La., constructed jointly by the interests to boost gas into the Southern Natural, the Mississippi River Fuel and Interstate gas lines.

Ford, Bacon & Davis, Inc., constructors of the plant, also are credited with bringing the various interests together in the project, the construction of which will afford a saving of 50 per cent over the cost of pumping the gas, were the job to be done by the separate interests. The ground was broken for the plant early in September and construction was completed November 27, 80 days later. The station is being operated by the Interstate Gas Co.

Three 1,250-H.P. Worthington units were installed in the plant, these being leased to the interests by the Southern Natural Gas Corp. The Pittsburgh-Des Moines Steel Co. supplied superstructure for the compressor buildings and all overhead water tanks. Fluor towers went into the project as did also Ingersoll-Rand circulating pumps. Crane Co. supplied all fabricated piping and valves.

New Building for Red River Power Co. at Grand Forks, S. D.

Red River Power Co., subsidiary of Northern States Power Co., operating in Grand Forks, N. D., recently completed a new office building in that city. Brick and steel were used, the structure having a cast aluminum front, with transoms and base pieces being of carrara glass. Columns at the front are of purple black brick and at night are illuminated by floodlights.

A showroom on the main floor is 50 feet by 60 feet in size. In the rear of the showroom are located the bookkeeping and distribution departments, and on the second floor are the offices of manager, general superintendent and accounting department. Tan walls, cream colored ceilings and woodwork of red gum with hand-rubbed walnut finish comprise the inside treatment.

Above the structure is a large sign suspended by a steel mounting piece with the company's name illumined. P. J. Montgomery is general manager at Grand Forks.

Lone Star System Personnel Changes Announced

Personnel changes announced recently by the Lone Star system are as follows: John Pearce, pipe line superintendent, was transferred from the Joshua division to the Richland division; George Minton was transferred from the Waco division to the Joshua division; T. E. Waddill, returned to Waco division from Clifton, Kan., on special work.

The Community Natural Gas Co. subsidiary of Lone Star announces the following changes: M. H. Bethel, formerly outside foreman at Sweetwater, Texas, has been transferred to Cisco. Alex Connell, division welder and utility man, has been transferred to Sweetwater from Stamford. W. A. Lewis, formerly of the Hamilton division, was transferred to Sweetwater division, but has recently resigned to accept a position in Pueblo, Colo.

E. Paul Young Named to New Post With Central Public Service

E. PAUL YOUNG has been appointed assistant vice-president in charge of sales of the Central Public Service Corp., headquartered at Chicago, Ill. Mr. Young will work with the managers of the various Central Public Service properties in the development of new business programs. Special emphasis will be placed on load building through sale of appliances and the addition of commercial and industrial business.

E. Paul Young

Mr. Young has been identified with the industry for several years, having had experience in many phases of building sales through commercial and industrial sales promotion with North American Light & Power Co. and its subsidiaries in Illinois, Missouri, Kansas and Iowa. He has also been identified with the National Public Service Corp. and with properties supervised by Day and Zimmerman, as well as with subsidiaries of the American Equities Corp. in Alabama, South Carolina, Kentucky, Texas and Louisiana. He has also been connected with the industry on the Pacific Coast.

1932 Calendar

January

Mid-West Industrial Gas Sales Council, American Gas Association, Palmer House, Chicago, January 15.

P. C. G. A. Northwest Sales Conference—Tacoma, Wash., January 22, 1932.

Southern California Meter Association—Los Angeles, Calif., January 28, 1932.

February

P. C. G. A. Mid-Winter Conference—Los Angeles, Calif., Feb. 17-18, 1932.

April

Arizona Utilities Association—Annual Convention, Tucson, Ariz., April 14-15, 1932.

Southern Gas Association—Annual convention, Tutwiler Hotel, Birmingham, Ala., April 19-21, 1932.

Missouri Association of Public Utilities—Annual Convention, April 28, 29 and 30, 1932.

June

Canadian Gas Association—25th Annual Convention, Fort Garry Hotel, Winnipeg, Manitoba, Can., June 9 and 10, 1932.

September

Pacific Coast Gas Association—Thirty-ninth Annual Convention, Spokane, Wash., August 23-26.

October

American Gas Association—Annual Convention, week of October 10-14, 1932, Atlantic City, N. J.

Fred C. Foy to Have Charge of Advertising and News at Seattle

FRED C. FOY has been named assistant general manager of the Seattle Gas Co., in charge of advertising and news, employee training and education and customer contacts. The announcement was made by James F. Pollard, general manager, who states that the creation of the new department is in accord with the expansion program of the company.

Fred C. Foy

Mr. Foy assumes his activities with the company following a background of experience in advertising and news, and is familiar with Seattle activities through his association with J. Walter Thompson Co. which arranges the Seattle Gas Co.'s advertising. Mr. Foy was supervisor of public utility accounts and manager of the new business department with the advertising agency, and was located in the company's San Francisco office. Direction of advertising and news for the San Joaquin Light and Power Corp. of Fresno has also been in Mr. Foy's line of experience. In addition, he served for two years as staff member for the United Press and East Bay newspapers in San Francisco. He is a graduate of the University of California, Berkeley.

Planning 1932 Sessions of Oklahoma Utilities Assn.

Plans are being made for the 14th Annual Convention of the Oklahoma Utilities Association, to be held at Tulsa, Okla., March 8 and 9, 1932. This convention will embrace all branches of the public utility industry in Oklahoma including gas, electric, telephone and electric railway utilities. The precedent of former years will be followed in the selection of a number of speakers of national prominence, in addition to other features of the program.

Argus Pipe Line Co. Building Line to Serve Power Plant

Argus Pipe Line Co., Dodge City, Kan., is constructing a gas transmission line from the main carrier operated by the company, the new line leaving the main at Dodge City, and extending 5 miles east to serve the newly completed plant of the Kansas Power Co. The extension will cross the Arkansas River. The company is a subsidiary of Northern Natural Gas Co., Omaha, Neb.

Natural Gas Department To Meet May 9, 10, 11

The Annual Convention of the Natural Gas Department, American Gas Association, is scheduled to be held in Tulsa, Okla., May 9, 10 and 11, according to announcement received late in December from Capt. A. E. Higgins, secretary of the Natural Gas Department. Since its organization the Department has held annual Conventions at Dallas, Kansas City, New Orleans and Memphis.

Hundreds of cakes baked by women of Council Bluffs are shown here as they appeared at the annual cake baking contest held by the Council Bluffs Gas Co., the day before Thanksgiving.

Cake-Baking Contest to be Annual Affair

By M. E. MILLER
Council Bluffs Gas Co., Council Bluffs, Iowa

FOUR hundred and sixty-three cakes were entered in the cake-baking contest conducted by the Council Bluffs Gas Co., Council Bluffs, Iowa, on November 25. The contestants baked their cakes at home in gas ovens and brought them to the gas company office, where they were judged and placed on display.

Twenty-five valuable articles were offered as prizes for the contest, the first prize being a gas range, and second a Janitrol conversion burner, and third a water-heater. Judging of the cakes was done by two domestic science teachers of the local high schools and one prominent home-maker.

After the cakes were judged, the display was open to the public. Charitable institutions in the city were given enough cakes to provide for their needs for Thanksgiving dinners. The balance of the cakes were then offered for sale by the Citizens Committee on Unemployment and Relief. Thus all the cakes entered in the contest were donated to or sold for the benefit of charity.

A tie-up was made with the local food products manufacturer, whereby each contestant was given a shopping bag filled with a package of macaroni, a package of breakfast food, and a small sack of flour. The value of this package was equal to or greater than the value of the cakes entered in the contest.

This is the third such contest conducted by the Council Bluffs Gas Co. Local newspapers and radio offered their cooperation after the contest was announced, which, according to the company, was not only a successful means of creating general interest and publicity for the gas company, but was also a benefit to the city's unfortunate.

The company plans to make the cake baking contest an annual affair each year the day before Thanksgiving, so that all cakes entered may be given to charitable organizations for Thanksgiving dinner.

Three Packers Asking Natural Gas Permit in Omaha

Three packing companies of Omaha, Neb., are seeking to bring natural gas into their plants for power use. Permission is being sought from the Omaha city council, and the Metropolitan Utilities District, now supplying the city with manufactured gas.

This action is being brought about by the fact that other branches of the packing industry located in Chicago, Kansas City, and Sioux City now have natural gas available and the Omaha plants cannot compete with their prices unless the city will give them the right to use the fuel.

If permission is granted, gas will be supplied by the Northern Gas and Pipe Line Co., headquartered in Omaha.

The American Smelting and Refining Co. of Omaha, whose plant is located on the banks of the Missouri river, has recently equipped its entire plant with natural gas and is being served from the pipe line crossing the river from Council Bluffs. The same supply line will be used for the packers, the application being for permission to cross city streets.

Mid-West Gas Assn. Convention St. Paul, Minn., Apr. 11-13

The Annual Convention of the Mid-West Gas Association will be held in St. Paul, Minn., April 11, 12 and 13, 1932. W. E. Derwent, first vice-president, is in charge of program arrangements. The Association includes members from Iowa, Nebraska, Minnesota, and North and South Dakota. John K. Swanson, vice-president and general manager of the Minneapolis Gas Light Co., is president.

MEASUREMENT and CONTROL

Eliminating Pulsation Errors in Orifice Meter Measurement

By T. K. M. SMITH
*Industrial Fuel Supply Company**

A COMMON and perplexing problem encountered in the measurement of a fluid by orifice meter is the accurate determination of discharge values when there is a pulsating flow existing in the pipe line in the neighborhood of the measuring station.

Engineers engaged in fluid measurement are no doubt familiar with this particular problem, and realize the effects such conditions of flow have upon the daily chart records as well as the mechanical operations of the differential gauge itself. Errors in gas accounting resulting from a pulsating flow, when they concern the many and large gas volumes passing in and out of various systems are sometimes considerable ones, and the effects which they introduce are often highly misleading when computing "unaccounted-for."

T. K. M. Smith

The magnitude of such erroneous readings is wholly dependent upon certain differing conditions, principally the varying characteristics of the pulsation encountered.

Both practical experience and numerous investigations demonstrate that it is impossible to calculate volumetric quantities with any accuracy when fluid is permitted to pulsate through an orifice meter. While some attempts have been made to apply a correction factor, or series of such factors, to the customary chart computations, with the purpose of totally compensating for the resulting inaccuracies produced by the influences of the pulsating flow, to the writer's knowledge little success has been met with along these lines. With no intent to discredit the many valuable studies given this subject, or the interesting information thus far published, it is believed that no one set of factors could be used to any commercial advantage to correct mathematically for the errors resulting from pulsating disturbances.

Characteristics of pulsating flows differ widely, depending upon the frequency caused by the pulsating producer, the velocity and density of the measurable fluid, the static pressure maintained and differential pressure created at the orifice, the ratio of the orifice size to the inside diameter of the pipe, as well as the type and range of differential recording gauge used, and its particular gauge piping assembly.

A pulsating flow can be defined as being the result of sudden changes of the fluid, both with regard to its velocity and pressure, the last mentioned probably being the most disastrous in creating errors in metering devices.

The causes of a pulsating flow are several, and can be attributed to the following, or any of their combinations:

1. Faulty operating of reducing or back pressure regulators.
2. Unbalanced automatic controllers.
3. Chattering effect of worn gate and check valves.
4. Gas delivered into lines from heading wells.
5. Drips on lines being filled beyond their capacity with sealing liquids, as well as like obstructions in the low places in the gas carrying lines.
6. Reciprocating action of compressors.

The last named can be unhesitatingly classified as the most common and the greatest producer of pulsation.

We know that one ideal solution to the problem of acquiring more accurate measurements is to locate the measuring station sufficiently distant from the source of pulsation. We realize that this is not always feasible, and even if it were the question would no doubt arise as to what was the minimum distance the meter or meters should be installed away from the source of disturbance to effectively eliminate errors in measurement due to the pulsating flow.

The answer to this is contingent upon certain individual factors, such as line sizes, and their carrying capacities, pressures to which the fluid is subjected, and the particular kind of pulsation with reference to its rhythmic wave. If possible some form of pulsation tests should be made along the line at frequent points to determine the severity of the pulsation. This method is perhaps the most satisfactory and quickest and eliminates guess work.

Regulators (especially the direct spring loaded, or the weight and lever type), check valves, controllers, and other mechanical devices if found faulty can undergo certain adjustments or repairs and sometimes the changing of the type of equipment employed might overcome the effects of pulsation, and produce more accurate fluid meter measurements. However, there may still remain a possibility that the means chosen will not completely remedy the condition.

If moisture or liquid entrapped in the pipe line, ahead or beyond the meter, is causing the pulsation, larger and adequate receivers should be installed. Something can be gained by automatically disposing of the condensate, or establishing the practice of manually blowing the drips at regular and necessary intervals, determined by the individual condition.

The reciprocating action of a compressor, or group of compressors, has a marked effect upon true meter readings and the errors created from this cause, when expressed in terms of per cent might be amazingly high. It has been authoritatively said that the magnitude of these errors, due to the pulsating flow, is likely to be several hundred per cent in severe cases.

The speed at which compressors are permitted to operate and also the size and capacity of the cylinders handling the gas, reflect upon the character of the pulsation waves, and produce errors in varying proportions. This has been evidenced in cases where units of a battery of compressors are operating at different revolutions per minute. Errors created in orifice meter measurements by several compressors so timed as to be "in step" and each unit operating at the same speed will be of a more serious nature than when they are operating "out of step."

Referring to orifice meter chart records, the fact that the differential pen makes a wide line across the range of the chart is not the only indication of the presence of pulsation. A wide and fluctuating differential record is usually the sign that the line in the vicinity of the meter has become sealed or partially sealed with liquid. Also, retarded or sluggish operating of regulators or controllers will produce similar readings. A record of this kind is due to the frequency of the pulsation waves, the time element between their cycles being far apart. Averaging the maximum and minimum limits of a wide differential record generally results in a mere approximation of the value of the square root of "h", for invariably the true mean is lower than the averaging method, and apt to vary over the daily chart interval, depending mostly on the pulsation conditions.

If the rapidity or frequency of the pulsation waves is fast, as when produced by several compressors operating at high speeds, it is quite possible for the differential pen to record a thin normal line, yet the percentage of error will be present, and of much concern.

We should not be guided by chart records alone. Mercury bushings and other devices installed in the "U" column of the gauge have little effect in arriving at more accurate measurements. Also the use of surge tanks or deadeners attached to, and of throttling devices installed in the gauge lines is of little benefit as far as eliminating these persistent errors is concerned. It will be agreed that all these artificial devices make chart reading much easier and faster, but it is only self-evident that the pulsating flow still exists in the line and through the orifice plate.

In considering any individual conditions where the flow is uneven or in the form of waves, the logical attack upon the influences of pulsation is to direct our attention to its utmost removal from within the carrying lines and the meter. This removal can only be accomplished by absorbing the pulsation waves set up by their producers.

Various mechanical devices have been used, and each possesses its own degree of effectiveness along with certain disadvantages. The greater the obstructions to the flow the smaller will be the error. Likewise, the greater the pressure restoration of the fluid immediately passing through the orifice, the more severely will the differential record be effected and consequently the magnitude of the resulting error.

One means of quieting the pulsation is the use of pinched valves, or the insertion of baffle plates in the lines, between the meter proper and the source of the pulsation. Baffle plates may be so made as to consist of a sin-

*Presented before the Southern California Meter Association, October 22, 1931.

gle orifice or of numerous perforations. Fig. 1 is a design of a perforated plate which possesses certain merits, having proven of considerable worth under individual operating conditions. Like all such similar means of dissipating pulsation, however, the principal disadvantage and objection to the use of baffle plates is that they contain fixed openings which, by their use, create inconsistent pressure drops, varying with the flow of the fluid.

The installation of this particular design of baffle plate should be such that when placed in the line, the counter sinking should oppose the direction of the gas flow. The theory of this is to not only subject the fluid to the required pressure reduction, but also to enervate the pulsation waves by the many conical openings, and to break up or divide the stream of flowing gas. As the pulsations resemble those of sound waves, this type of obstruction offers the same effect as when forcing sound through a megaphone where the discharge is the smaller of the two openings.

Pressure regulators installed between the meter and the source where the pulsation originates will tend to lessen the error, but their maximum value will be obtained where the differential across the valve is the greatest. These means of quieting pulsating flows will necessarily produce pressure drops, and such energy losses are detrimental and costly to the compression and transmission of natural gas. Therefore these applications to the problem should be discouraged as much as possible.

In the writer's experience, passing a fluid in and out of large capacity tanks has been found to produce the maximum effect in restoring a smooth, even flow, necessary to ideal metering conditions.

Cylindrical tanks of large volume offer the best and most practical means of "killing" pulsation, and are probably more efficient where the tank diameter is relatively large.

Unless the capacity tank is of sufficient

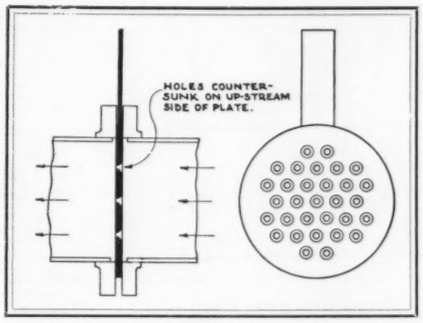


Fig. 1. Orifice plate for reducing pulsations.

volume, the results derived from its application will be disappointing. It might be said that the larger the volume, the greater the effectiveness.

The following experimental formula has been found to be of value in determining the proper volume where certain factors are known:

$$HV^2 > 2P\,\frac{D^2}{d^2}$$

H = Drop in Pressure, lbs. per sq. in.

V^2 = Volume in cubic feet between meter and source.

P = Absolute pressure, lbs. per sq. in.

D^2 = Diameter of pipe in inches.

d^2 = Diameter of Orifice in inches.

A study of pulsating fluid flows and their effect upon orifice meter measurements was undertaken by the writer's company at a large natural gas compressor station in the Signal Hill oil field and some interesting and satisfactory results were obtained.

All the work done was on the low pressure suction or intake lines to several compressors at approximately 15 to 18 pounds per square inch gauge. In one particular line was installed a capacity tank, and due to its design it was possible to eliminate the pulsating influences to a material degree, if not entirely.

This capacity tank is of cylindrical shape and its dimensions are 6 feet in diameter and 18 feet in length.

Referring to Fig. 2, a sketch of one of the tanks used, the inlet connections are such that the gas is permitted to enter the tank at both ends. Five 5-inch pipes extend through the entire length of the tank and are connected at each end to the 16-inch headers. Valves are installed on each pipe entering the pulsation tank, and afford the flexibility of changing inlet areas corresponding to the various rates of flow. Each of these feeder pipes is perforated with two rows of 5/8-inch holes the full length of the inside of the tank, the drillings being of a staggered nature and on the lower circumference of the pipes, with 2½-inch centers. There is a total of 860 such holes and their locations are so drilled that if it is desired to further dampen the pulsations, these openings may be submerged in an oil or other sealing liquid. However, it has not been necessary to use this procedure, and it is not generally recommended, for the reason that such throttling would only tend to increase the pressure drop which, as we know, is undesirable and detrimental to the transmission of low pressure gas.

The discharge of the tank is at the top and equi-distant from the ends. If necessary, the by-passing of the tank is simple, as will be seen.

Fig. 3 illustrates a pulsating tank of smaller dimensions, also very effective in its use. Numerous ¼-inch connections are attached to the tanks and headers, at convenient points for the purpose of observing the pressure drops through the apparatus.

Fig. 4 diagramatically shows the layout of one of the installations and is described as follows: At a distance of approximately 50

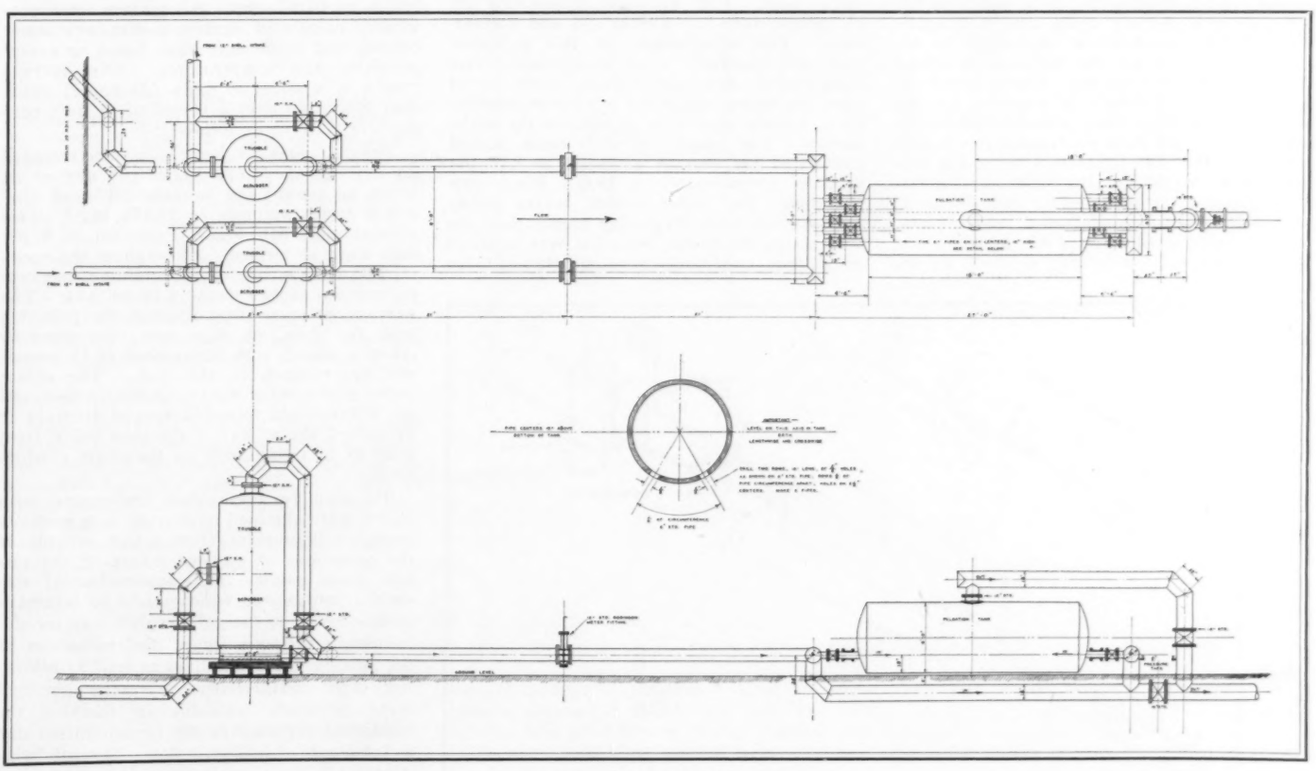


Fig. 2

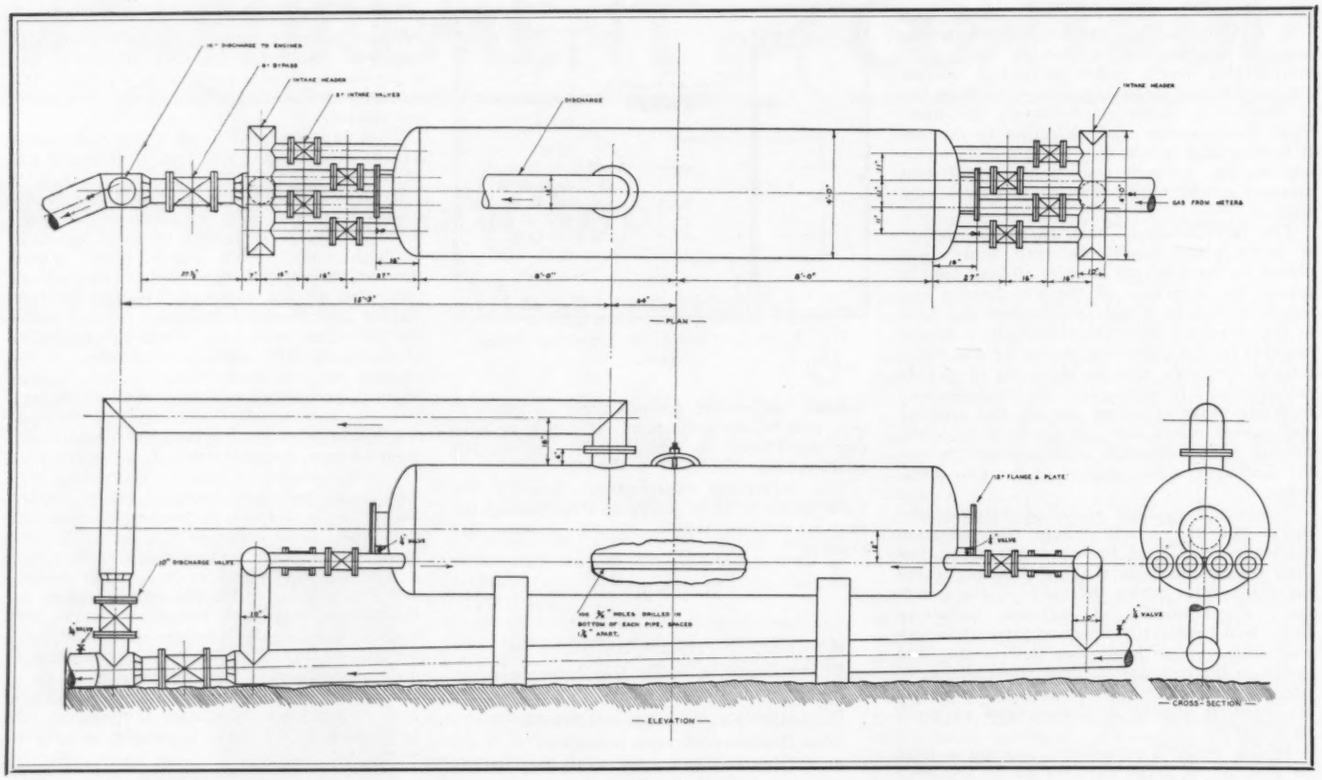


Fig. 3.

feet up-stream from the 16-inch general low pressure plant intake header were originally installed two 12-inch orifice meters of the conventional flange type and thin plate orifices shown at "A" and "A_1." Measurements through these meters and adjacent to the compressors were subjected to pulsation due to the reciprocating action of as many as fifteen 200-H.P. 4-cycle units, and this condition of flow rendered it impossible to accurately account for the volumes delivered to the compressor station. These meter recordings were seriously in question, for not only was the daily plant unaccounted-for inconsistent in per cent corresponding to volumes handled, but apparently beyond a reasonable allowance for the volumetric difference between the plant intake and discharge orifice meters. This difference, as we know, is chargeable to shrinkages due to water and gasoline vapors condensed, as well as the loss due to the deviation from Boyles' Law.

Upstream some 60 feet from meters "A" and "A_1" is installed the pulsation tank "C" and on the inlet to this tank were installed two additional meters "B" and "B_1" of sizes similar to the ones near the compressors, with the exception that improved orifice fittings were used. The pressure connections on all meters were full-flow or 2½ and 8 diameters. The effectiveness of this pulsation tank was carefully noted and checked and comparative flow calculations were based upon the recordings of the two meter installations, namely with inlet as against the outlet meters. The results of differences varied from 4.56 per cent to as much as 7.54 per cent on approximately a 19,000 M.c.f. rate per day. The outlet meters, where pulsation existed, were invariably higher than the two above the tanks, where it was believed ideal flow conditions were maintained. An error in this direction should not be accepted as a criterion for all problems of pulsation. The above differences were the results of tests made over a duration of a half hour each, with the use of separate clocks installed in all the differential recording gauges to allow the charts to rotate at a speed of one revolution in 30 minutes. All gauges were previously calculated against a standard water column and coefficients were based on actual gravities and temperatures. The average results of a series of daily (24 hours) readings conducted over a period of 21 days consecutively, were as follows:

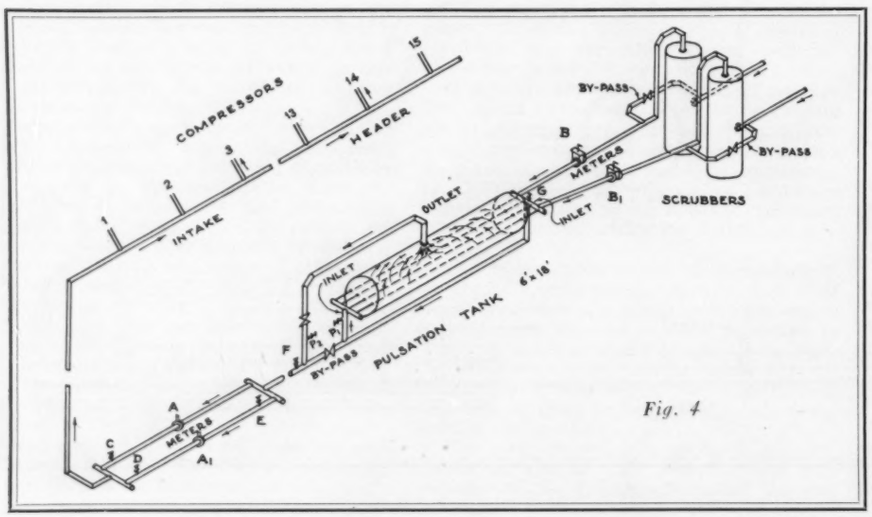


Fig. 4

The "A" and "A_1" orifice meters recorded an average of 15,610 M.c.f. per day of 24 hours as against the average "B" and "B_1" orifice meter volumes of 15,154 M.c.f. This difference of 456 M.c.f. amounted to 3 per cent when so termed. Throughout the series of tests the maximum and minimum per cent differences ranged from 2.13 to 4.41. The average pressure drop through the pulsation tank for these 21 days was approximately .59 of a pound, with an average of 18 pounds per square inch in the tank. The orifice meter plates were 12x6½ inches in size and the differentials recorded ranged from 14 to 21 inches, the widths of the lines being from 2/10 to ¾ of an inch on the chart graduations.

To amplify these data, numerous strip charts were obtained by the use of a specially designed instrument from which records of the pulsations at various points of the system were made. The application of this special instrument, which might be termed a "pulsometer" or "wigglegraph," was for determining the severity of the pulsations of the flowing gas in the lines as well as recording their characteristics. Results obtained were extremely valuable in studying the conditions reflected in the measurements due to influences of pulsating flow. Several "wigglegraph" charts are shown herewith, and their explanation is as follows:

*Test No. 1**

Strip chart "A" shows a record of pulsation in an 8-inch line at a point some 40 feet from the outlet of the pulsation eliminating tank, as shown in Fig. 3, and adjacent to the 16-inch compressor plant intake header. The gas passing the connection to which the pulsometer was attached was being delivered to one 200-H.P. 4-Cycle compressor unit having a cylinder of 12-inch diameter and a stroke of 24 inches. At the time the test was made, this unit was being operated at a speed of 188 R.P.M. The pressure on the pulsation tank was 14.5 pounds per square inch gauge. The quantity of gas being delivered by the compressor was at a rate of approximately 1,400,000 cubic feet per day. During this test the pressure drop through the pulsation tank was 2 inches of water. It is interesting to note the uniform cycles of these pulsations.

Test No. 2.

Strip chart "B" shows a record of the pulsation existing at the same point as mentioned in Test No. 1, the gas at this point being delivered to two compressor units of similar size. The pressure on the pulsation tank was approximately 14 pounds and the speeds at which these compressors were being operated were 188 R.P.M. and 196 R.P.M. The pressure drop through the tank at the time this test was made was 7 inches of water. Note irregularity of the cycles.

Test No. 3.

Strip chart "C" shows a record of pulsation existing at the same point as mentioned in Test No. 1, the gas at this point being delivered to three compressors of the same type and size. Pressure on the pulsation tank was 14.— pounds per sq. in. gauge. The speeds at which these compressors were being operated were 188, 196 and 192 R.P.M. The pressure drop through the pulsation tank at the time this test was made was 18 inches of water. No comparative volumes were obtained in checking the efficiency of this particular pulsation tank.

Test No. 4.

Strip chart "D" shows a record of the pulsation existing at the same connection as mentioned in Test No. 1 and the gas at this point was being delivered to several of eight 200-H.P. 4-cycle compressors. The gas was delivered into the general intake header along with other gas from a different source. The pressure on the pulsation tank was approximately 15 pounds per square inch gauge and the speeds of the compressors were as follows: 188, 196, 192, 192, 190, 194, 193 and 192 R.P.M. The pressure drop through the pulsation tank at the time this test was made was 2 inches of water.

Test No. 5.

Strip chart "E" shows a record of what occurred in the line with reference to pulsation ahead of the tank. The volume at the time this test was made was at a rate of approximately 1,403,000 cubic feet per day. The orifice plate size in this meter was 10 x 4½ inches and the average chart readings were 14.8 pounds per square inch static and 3.8 inches differential. Full flow, or line pressure taps, were used on this meter. The record on this chart contrasts greatly to the ones obtained on the outlet of the pulsation tank.

Test No. 6.

Strip chart "F" shows a record of pulsation cycles. It will be noted that when the compressor operating speeds get into and out of step this condition is closely charted—the wide record showing operation in step and the less violent record showing operation out of step.

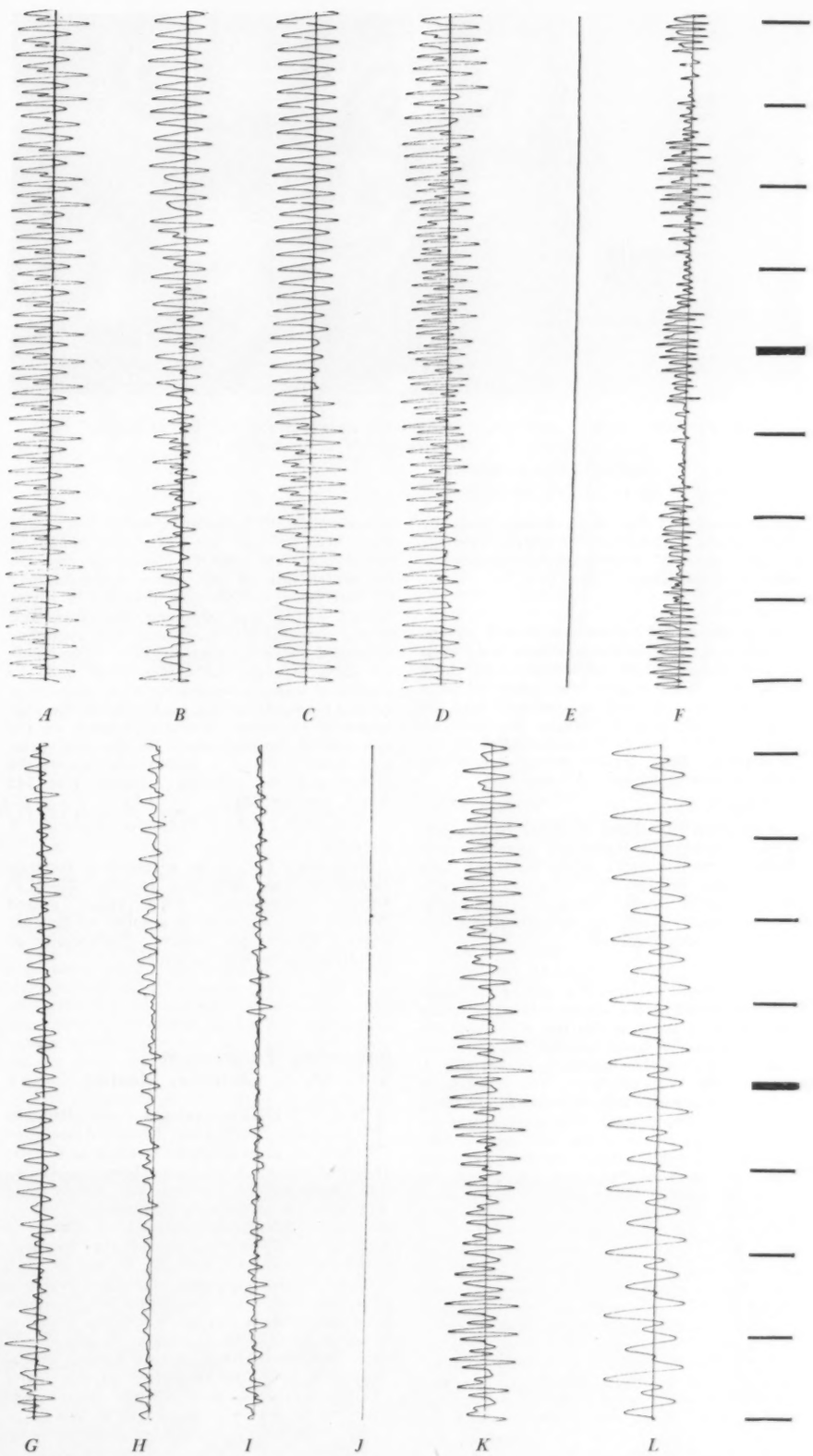
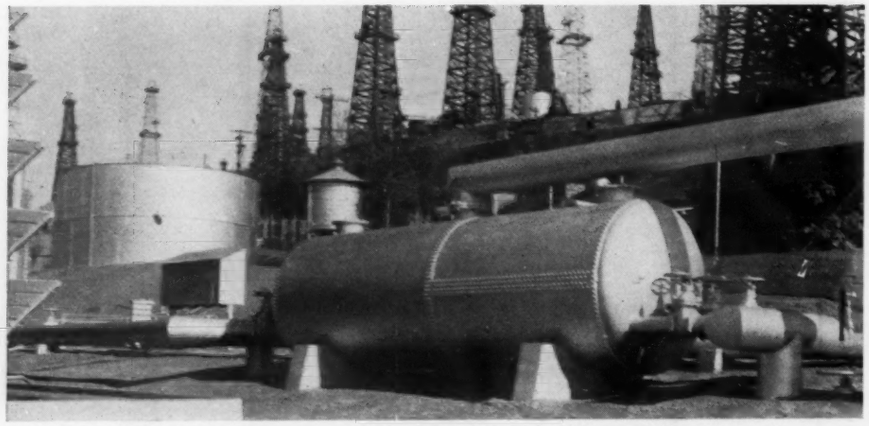


Fig. 5.

Test No. 7.

Strip chart "G" shows the record of the pulsation existing at a point on the outlet side of check meters "A" and "A_1." This record was taken at point "D" as shown in Fig. 4, this "D" connection being in the meter run

*See Fig. 5. Reference scale at right of strip charts is graduated in intervals of seconds. It applies to all strip charts shown, with the exception of "L."



View of large volume cylindrical tank installation developed by Industrial Fuel Supply Co. for elimination of pulsation.

approximately 18 feet down-stream from the orifice plate. These meters deliver into the 16-inch general low pressure compressor plant intake header.

Test No. 8.

Strip chart "H" shows a record of the pulsation existing in the upstream side some 18 feet ahead of the orifice plate in check meter A_1. This record was taken at point "E" (Fig. 4). It will be observed that the magnitude of these pulsations has been reduced slightly, due to the differential of approximately 19½ inches water across the orifice plates in meters "A" and "A_1."

Test No. 9.

Strip chart "I" shows a record of the pulsation existing at a connection approximately 20 feet from the outlet of the pulsation tank at the point marked "F" (Fig. 4). It will be seen that a further decrease in the pulsations has taken place, due to certain pressure drops and added volume.

Test No. 10.

Strip chart "J" shows a record of what occurred ahead of the pulsation tank at point "G." During the time this test was made the average pressure drop through the pulsation tank was 1.35 inches mercury, or the difference between "P_2 and "P_1." The pressure in the pulsation tank was approximately 16½ pounds per square inch. The average results of five orifice meter check readings of "B" and "B_1" meters (ahead of the pulsation tank) and meters "A" and "A_1" (on the discharge side of the pulsation tank) were as follows:

The first two mentioned meters "B" and "B_1" had 12 x 6½-inch orifice plates in use and recorded a total average of 14,444,000 cubic feet rate per day. For the purpose of checking these five readings the calculated volumes as recorded by the two check meters "A" and "A_1" on the outlet side of pulsation tank or near the source of pulsation, averaged a total of 14,990,000 cubic feet rate per day, or a difference of 456,000 cubic feet rate per day. This amounted to a plus difference of 3.68 per cent. All pressure connections were of the full flow type. During this particular test eight machines were being operated at speeds of 188, 196, 192, 192, 190, 194, 193 and 192 R.P.M. No evidence of pulsation is noticeable. The straight line shown in strip chart "J" is a true record, reflecting ideal flow conditions.

Test No. 11.

Strip chart "K" shows a record of the pulsation existing in the fuel meter at a compressor plant. The point at which this record was taken was in the meter run ahead of the orifice plate some 18 feet up stream. On the outlet side of this meter approximately 25 feet from the plate is installed a direct loaded spring type reducing regulator, and at the time the test was made this regulator appeared to be surging slightly. The overall drop through the orifice plate and the regulator was approximately 13¾ pounds, or from 15 pounds on the high side of the regulator to 35 inches of water pressure on the low side of the regulator. Of this total pressure drop 7/10 of a pound was across the orifice and the quantity handled was 742 M.c.f. rate per day.

Test No. 12.

Strip chart "L" shows a record of the pulsation of gas delivered to one 200-H.P. 4-cycle compressor. This chart passed through the instrument at a speed of approximately 12 feet per minute. Uniformity of pulsation cycles will be noted.

Interesting Program at S. C. M. A. Christmas Meeting

FOLLOWING several years precedent, the Southern California Meter Association held its pre-Christmas meeting at the Rio Hondo Country Club, near Downey, Calif., on December 17. After the dinner, the members were entertained with comedy musical numbers rendered by L. H. Dell and two other representatives of the Southern California Gas Co. O. R. C. Grow, San Pedro district manager for the Southern Counties Gas Co., introduced the business program with a paper on "The Personal Element in Gas Measurement." Mr. Grow dealt in humorous vein with a number of the practical difficulties inherent in men and equipment, which preclude the securing of absolute accuracy in measurement.

A discussion of "Gas Measurement Practice in Northern California" was brought to the Association by F. F. Doyle, manager of the Pacific Gas and Electric Co.'s natural gas division. Mr. Doyle presented a fine selection of slides, showing measurement stations and equipment on the Pacific Gas and Electric system, and gave a running description of each view. General discussion following the talk also brought out features of metering and measurement design in use by the P. G. and E.

S. C. M. A. Forum of Experience

"Knowledge is built upon the experience of others."

ANY reader of this department is welcome to submit practical questions on measurement and control to the "Question and Answer" committee of the Southern California Meter Association. This committee, of which H. E. Thompson is chairman, each month propounds new questions in the "Measurement and Control" section of *Western Gas*, and answers them the month following. Send new questions, or your answers to questions which appear below, to

S.C.M.A. "Q. and A." Committee
Box 1100, Sta. C, Los Angeles, Calif.

This Month's Questions

Q. 113. What is the best metal for orifice plates in gas service, and what thickness is recommended for plates?—M.F.A. (Ed. Note: This is, of course, somewhat a matter of preference.)

Q. 114. Is it absolutely essential that the square root of the product of differential and static pressure be extracted in calculating gas flow by orifice meter?—G.H. [Ed. Note: It is not known whether the questioner considers the use of a square root chart as a means of eliminating the square root extraction (by the chart reader) or as a means of mechanically extracting it for him.]

Q. 115. Are straightening vanes always necessary for accurate gas measurement? If not used where needed what is the error and why does it exist?—V.G.M. (Ed. Note: If the "what" and "why" of this matter were better understood, undoubtedly more vanes would be used.)

Q. 116. Which will pass the most gas, four 2-inch pipes, or one 4-inch pipe?—L.H.T.

Previous Questions Answered

A. 109. It will be noted that in gas measurement static pressure and differential appear in the calculation under identical circumstances. To illustrate, the $\sqrt{hP}$ could as well be written $\sqrt{Ph}$. Suppose a case where the numerical value used for "P" was 10 per cent low, while the value used for "h" was correct. In the calculation would appear the quantity $\sqrt{(1.0h) \times (.9P)}$ which evidently is no different from $\sqrt{(.9h) \times (1.0P)}$ as either could be written $\sqrt{(1.0 \times .9)\,hP}$. So it is evident that the matter of accuracy (on a per cent basis) is equally important in regards to both the differential and the static pressure; (taking the static pressure, of course, at its absolute value, or gauge pressure plus barometer).—H.E.T.

A. 110. Orifice meter pressure piping should never be less than ½ inch except possibly adjacent the recorder. One-fourth inch pipe costs so nearly as much as ½ inch pipe that the element of economy in material is not worth risking a replacement that would cause a duplication of labor. —M.D.

A. 111. The only satisfactory way of cleaning mercury that contains foreign matter is to distill it. However, the following may be said: If the foreign metal is copper it may be disregarded, as the amount will be negligible. If the mercury is contaminated with zinc, submerge it in 10 times its volume of 10 per cent sal-ammoniac solution with a layer of carbon or coke about ½ inch thick floating on the mercury and under the solution. This will produce an electrolytic effect that will cause the zinc to be dissolved as zinc chloride in the solution. Shake several times a day during at least two weeks. If the foreign metal is aluminum, bubble air through the mercury for a week. This will oxidize the aluminum.—H.E.T.

A. 112. In a certain sense there is but one method of calculating gas flow from the pressure data created by using an orifice. as other methods must be merely special forms of this one. The general formula is $Q = C\sqrt{\frac{LP}{ST}}$. A very interesting form of this in which pressure, specific gravity and temperature do not *directly* appear, is

$$Q = C\sqrt{h\,\frac{\text{density of air at pressure and temperature of the gas}}{\text{density of the gas at 30 in. and 60° F.}}}$$

This may be transposed readily into forms in which pressure and temperature, or specific gravity, or even the differential do not directly appear.H.E.T. (Ed. Note: Our inventor friends might make use of the above, in that it indicates a possibility of producing a single-pen recorder, using square root chart, that will record cubic feet per hour inherently corrected for temperature and specific gravity. However, the mechanical considerations might prove somewhat awkward.)

Course in Natural Gas Offered By University College, Los Angeles

University College, connected with the University of Southern California, will offer a class in natural gas during the winter quarter beginning January 4 and lasting through 12 weeks. The class will be held on Thursday nights from 6:30 to 8:50. The instructor is S. E. Merenbach. Prospective students may attend the first lecture before enrolling.

The following subjects will be treated during the 12 weeks: Origin of natural gas, measurement of gas flow of wells, determination of pipe line capacities, detection and elimination of air in gas lines, complete analyses of gas, checking and computing orifice meters and charts, advantages and disadvantages of different types of gas traps, effect of vacuum on gas and oil, pipe line inspection, and efficient use of fuel gas.

Sprague Meter Co. Offers New Manual on Repair of Meters

The Sprague Meter Co., manufacturer of cast iron gas meters, recently brought from the press its Manual No. 17, covering the repairing and testing of meters and regulators especially designed for engineers, superintendents, meter shop foremen and repair men interested in meter construction and maintenance.

The manual is interesting in that the illustrations have been arranged in the same sequence as a movie film and as far as possible the reading matter has been synchronized with the illustrations in order to approximate the effect and interest of a talking picture. Copies of the manual may be obtained by addressing the company at Bridgeport, Conn.

Leakage in City System Reaches 44 Per Cent in November

City authorities are relaying several blocks of gas distribution mains in the municipally owned gas system of Pryor, Okla., in an effort to reduce leakage. The loss in the system from that source in November reached 44 per cent. The city gas department hopes to reduce line losses sufficiently to put the city system on a profitable basis.

181 Attend Annual Meter Short Course

SESSIONS of the Eleventh Annual Meter Short Course and Conference, held at Ames, Iowa, were reported as being unusually beneficial and instructive, and having an attendance of 181.

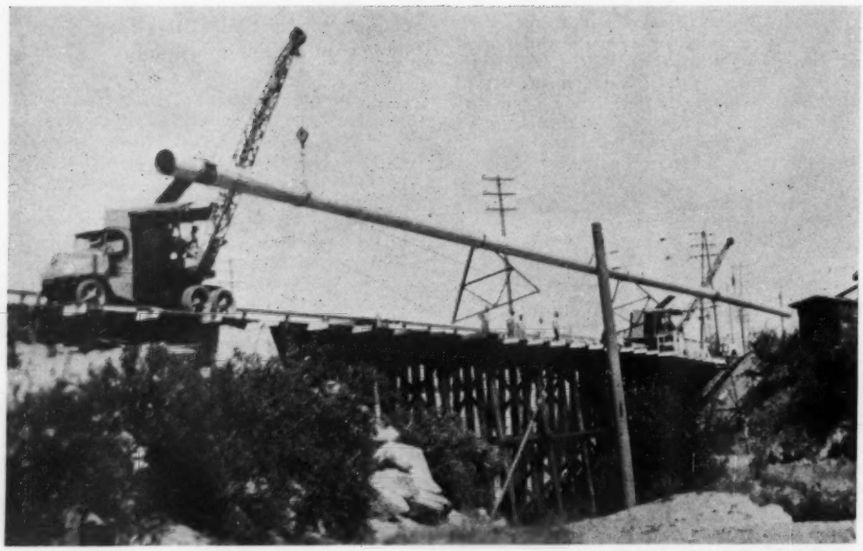
The course is conducted each year as a cooperative interest of the Mid-West Gas Association and the Iowa State College, and includes theoretical and practical work in fluid measurement and allied subjects. The course began this year on December 8, continuing through the 11th, with sessions divided into two sections. As in other years, Section A was devoted to shop practice, and Section B to the theories of measurement.

Owing to the fact that change-over to natural gas from the manufactured product has taken place in many cities and towns in the Association's territory, several of the featured addresses were built around the problems encountered in this work. Pipe line construction for natural gas transmission, testing meters, servicing customers' appliances, orifice meters, pressure regulation, all came in for their share of discussion before each of the Sections.

The committee in charge of arrangements was this year chairmaned by R. L. Klar, engineer of distribution for the Des Moines Gas Co., Des Moines, Iowa, and second vice-president of the Mid-West Gas Association. He was assisted by Geo. A. Lane, Chicago, Ill.; Lester J. Eck, Minneapolis, Minn.; Arnold C. Rathkey, Waterloo, Iowa; W. A. Pike, Marshalltown, Iowa; D. C. Faber and L. W. Mahone, Ames, Iowa; C. T. Williams, Sioux City, Iowa; A. T. Barrett, Chicago, Ill.; J. M. Drabelle, Cedar Rapids, Iowa; R. F. Galpin, Muscatine, Iowa; A. L. Fritchey, Pittsburgh, Pa., and Howard Peirce, Davenport, Iowa.

An address given by O. K. Smith of the United Light & Power Engineering & Construction Co., Davenport, Iowa, at the afternoon session on December 9 appears on page 27 of this issue of *Western Gas*.

Students in session at the Eleventh Annual Meter Short Course and Conference, held at Ames, Iowa, under the sponsorship of the Mid-West Gas Association and the Iowa State College at Ames, December 8-11.



Something different in design of suspension crossings is shown in this view of the Arroyo Seco crossing west of Pasadena. Two cranes are placing the 160-foot section of 26-inch pipe. Note the two inverted trusses with cables to act as stiffeners preventing pipe from sagging. Pipe is carried entirely on supports at either side of the ravine crossing.

Longest 26-in. Line Goes into Service

(Continued from Page 25)

a 60-foot length at the option of the buyer. This pipe was made from 0.20 to 0.30 carbon steel having minimum strength of 60,000 pounds.

A. O. Smith Corp. furnished 79 miles of 26-inch, ¼-inch wall pipe made from high carbon, high tensile strength steel of 0.35 to 0.45 carbon content and minimum strength of 70,000 pounds. Other pipe used was 0.20 to 0.30 carbon steel and furnished by A. O. Smith Corp. Conductor pipe for railroad and highway crossings was furnished by the Consolidated Steel Co.

Automatic pressure limiting stations were designed and located at each point where the pipe wall thickness was reduced, in order to hold the pressure within safe limits on the thinner wall pipe. The system is designed for an initial pressure of 400 pounds in the field, and a minimum delivery pressure at the extreme southern terminus of the line of 50 pounds.

Another view of the Arroyo Seco suspension.

Pipe Protection

A soil survey of the entire route was made and a pipe protection schedule developed to take care of the varying soil conditions found. The protection ranged from a minimum of two coats of cold paint to a maximum of two coats of hot application with a wrapper in between.

The pipe was cleaned of all scale at the mill, either by pickling or shot blasting, and shipped to the job bare. Before any coating was applied the accumulation of rust or dirt was removed. In this manner it was possible to secure an unusually good bond between the pipe and the coating.

The crossings of Castaic Creek and Santa Clara River were made by placing the line well below the beds of the streams. Sufficient concrete anchorage was provided to overcome the bouyancy of the pipe. The crossing of Big Tujunga Wash was made on a carefully designed suspension bridge 720 feet in length.

Across Cerritos Channel, of Long Beach Harbor, 800 feet of 16-inch cast iron line was laid in about 35 feet of water at an elevation of minus 41 feet below mean lower low water. The lengths were joined with victaulic couplings and the line well anchored at each side of the channel.

The satisfactory completion of the line well ahead of schedule is evidence of the cooperation and the coordination of the various parties involved. The line was placed in operation November 17, 1931.

Lakefield, Minn., Permit Asked

Application is on file in Lakefield, Minn., for a permit to serve gas there by the American Gas Construction Co., Minneapolis, Minn.

Pamphlet Issued on Gas Company Merchandising

"WHY Gas Companies Went into the Appliance Merchandising Business and What They Have Done for It" —this is the title of a 24-page pamphlet just prepared and released by the American Gas Association. The booklet is designed for distribution to gas companies at moderate cost, to be in turn distributed among dealers and others concerned with appliance merchandising. Its title is explanatory of its purpose—to explain the reason and necessity for gas company sale of appliances.

The pamphlet opens by supplying some of the historical background of gas company sales work, making it plain that gas companies have always found it necessary to promote the use of their commodity by selling, and that such promotional work resulted in lowering of rates due to greater volumes of gas sold. Even in the early period of gas lighting, the pamphlet points out, intensive sales work on lighting equipment was necessary to meet kerosene lamp competition.

The sale of more gas has always been the utility's prime reason for merchandising, and the industry has always borne the load of promoting new appliances. Incidentally, this promotion has created markets for the retailer, in which he shares to a much greater extent than does the utility. It is estimated that the gas ranges marketed each year by dealers number approximately 600,000 and bring revenue of about 36 million dollars. Dealer sales of water heaters are estimated at 20 million dollars annually. Continuance and expansion of these markets demands that the utilities stay in the merchandising business, maintaining high standards of equipment, popularizing the newer types of appliances and new developments in established appliances. Where the utility has withdrawn from the active sale of appliances and confined its efforts merely to advertising and general promotional work, the total volume of appliance sales has fallen off to a marked degree, with dealers doing less business than when the utility was handling appliances.

Pointing out that the utility welcomes the dealer as a sales ally, the pamphlet recommends that neither dealer nor gas company seek to dominate the field, but each benefit from the other's participation. No one plan of dealer-company cooperation is recommended, as this is held to be a matter governed by local circumstances. The pamphlet concludes with a statement of principles suggested for guidance of gas companies as a basis for promoting cooperative trade relations.

The American Gas Association in this pamphlet has provided the industry with a straight forward statement of why gas companies must merchandise, and it is anticipated that there will be a general demand for the booklet.

Grand Island, Neb. Now on Natural Gas Service

The Central Power Co., subsidiary of Middle-West Utilities Co., Chicago, began natural gas service in Grand Island, Neb., on December 13, changing the entire town over at once. Gas was turned into the mains of Nebraska City later in the month by the same company.

Glenwood Served December 9

Iowa Distributing Co., subsidiary of Northern Gas & Pipe Line Co., Omaha, Neb., turned natural gas into the mains at Glenwood, Iowa, on December 9. L. G. Hepworth is district manager at Glenwood.

Gas for Citrus Protection

(Continued from Page 23)

types of equipment and finally chose a small automatically controlled boiler operated with natural gas. Operating costs were reduced 80 per cent, all fire hazard was eliminated, and a fixed temperature of 220 degrees was maintained at all times.

The waxing boxes, 20x5x3½ feet, through which 10 field boxes of oranges may pass every minute, are equipped with a series of rotating brushes over which the oranges pass while atomizers, located in the roof of the box, spray a vaporous form of wax over them.

The new equipment referred to consists of a small high pressure gas-fired boiler fitted with automatic controls which include water feed, steam pressure control, low water fuel cut-off, thermostatic pilot, and return condensation and pump unit with Mercoid switch control.

The waxing box is fitted with copper fin radiation, which is located longitudinally directly under the brushes.

The boiler is located as close as possible to the box and the steam connected to radiation through a steam valve controlled with multiple element supersensitive thermostat. A thermostatic trap is installed in the discharge from radiation 6 or 8 feet distant, thence piped to return condensation unit.

Operating this system requires no manual attention, excepting turning on and off the gas when starting and stopping; maintains a more even temperature in the box than any method previously tried; and, incidentally, reduces the cost of the operation about 80 per cent.

Two boxes, operated at the same time for one full month in the same packing house and under identical conditions—one as outlined above, the other with electric elements—obtained the following results:

Gas-Fired Steam:	
Cubic feet gas used per 1000 field boxes	621.3
Average cost per M.c.f. of gas	45c
Gas cost per 1000 field boxes	30.23c
Electric Operation:	
Kilowatt hours per 1000 field boxes	72.888
Average cost per kilowatt hour	2.06263c
Cost per 1000 field boxes	$1.5032

Natural gas, of 1150 B.t.u. per cubic foot, was used in the above test.

Heat Treating by Immersion

(Continued from Page 31)

Rockwell of 58-60 on the B scale. Wire baskets are used for handling different shaped parts, the longest being about 8 feet. Some parts are formed here and these are frequently annealed to bring them to a satifactory softness so that they will not crack during this operation. In this case they are immersed in the same hot solution, but at a temperature of 600-650 deg. F. and for periods ranging from 12 to 16 hours.

Most all parts not of aluminum are received at this plant already heat treated, but there are some exceptions and for these there is another heat treating room which is equipped with standard brick and steel furnaces. There are two of the box type, one being 3 feet square and 4 feet long and heated with two gas burners. This is used mostly for heating stainless steel, (KA2) sheet, for forming into exhausts. These must be formed hot. Another is 4 feet square and 5 feet long and is heated with four similar gas burners. This is used interchangeably for all kinds of heat treatment.

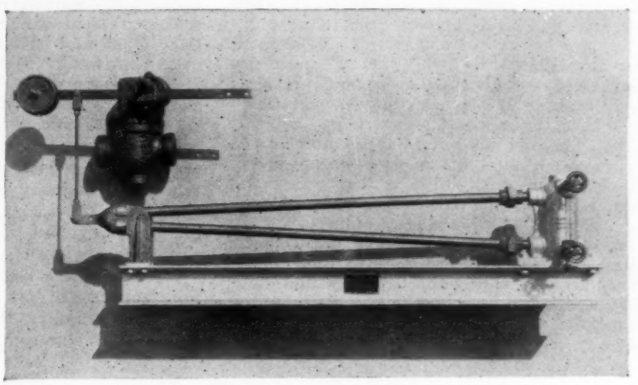
For treating tool steel there is a small semi-muffle gas-fired furnace. A salt bath is used for some material and consists of a pot 10 inches in diameter by 16 inches deep which sets in a 3½ foot diameter brick furnace heated with two high pressure gas burners. Parts made from 2330 and 4130 S.A.E. steel are heated to 1500 deg. F. and 1625 deg. F. respectively for 20 minutes in this pot, quenched in oil and reheated to 1050 deg. F. A rectangular lead pot 3 feet square and 4½ inches deep is heated with six atmospheric gas pipe burners located underneath and extending the entire length. These are all connected to the same manifold. This pot is used for leading radiators and the molten lead is also poured into dural tubes that are bent into ribs. After bending, the ribs are submerged in the pot and the lead re-melted so that it can run out.

The standard aircraft steel for structural members used here is a chrome molybdenum alloy listed as 4130 S. A. E. This is normalized at 1600-1700 deg. F. and then reheated and hardened in oil at 1600-1650 deg. F. The parts are then drawn to give various combinations of hardness, toughness and tensile strength as follows:

Degrees F	Tensile Strength Lbs. sq. in.
400	230,000
600	205,000
770	180 000
970	150,000
1000	145,000
1150	125,000
1200	115,000

The gas tanks for the Boeing planes are of aluminum and extensively baffled inside in order to support the sides and prevent the gas from slushing. All of the edges and seams are welded while the baffles are riveted. The rivets are put in place and the ends melted down with a torch instead of being hammered. The tanks are then annealed for a few minutes at 600 deg. F., which renders the whole structure ductile enough to be unaffected by the vibration of the plane.

AT RIGHT:
The water-level mark on the main body of the regulator is set on the same elevation as the desired boiler water-level. A connection is brought from the boiler water-level, both meeting at the regulator body.



New Boiler Feed-Water Regulator

A NEW boiler feed-water regulator that is claimed to be self-compensating for variations in atmospheric temperature and boiler pressure, has been developed by G. W. Volz, and is to be manufactured and distributed by J. A. Campbell Co., Long Beach, Calif. This regulator has only one moving part and is automatic in action.

The Volz feed-water regulator consists essentially of two expansion tubes connected into a body casting and meeting at their outer extremities in a close return-bend. The lower tube is the working element and the upper tube the compensating element. The return bend carries a lug, to which the valve linkage is attached; and the expansion and contraction of the working tube induced by slight changes in water-level is multiplied and translated into vertical movement, which is directly transmitted to the valve stem.

The accompanying drawing illustrates the principle. The "water-level" mark on the main body of the regulator is set on the same elevation as the desired boiler water-level. A connection is brought from the boiler water-level, both meeting at the regulator body. The two expansion tubes leading from the regulator body are of heavy brass pipe and converge in a brass return-bend casting, with a lever connection for operating a balanced valve.

When the regulator is properly installed, the water-level in the lower tube is approximately three-quarters of the way out from the gauge-glass chamber. In operation, the upper part of the regulator body and the upper tube are, of course, filled with steam, which meets the water in the lower tube.

If the rate of steaming increases, the water-level will drop slightly in the boiler and also in the regulator. This brings steam further down into the upper end of the water tube, causing the tube to expand; thereby raising the lever and opening the balanced valve. When the water-level rises to the correct point, the reverse of the above action closes the valve, which prevents water from rising too high in the boiler.

Both brass tubes being exposed to the atmosphere automatically compensates for changes in atmospheric conditions, because the change in temperature affects both tubes equally. This feature likewise compensates for variations in steam and water temperatures due to changes in boiler pressure.

This device will operate any standard balanced valve such as illustrated in the drawing, and can be fitted to any type of boiler where automatic regulation of the water-level is desired, according to the inventor. A bulletin describing the regulator has been prepared by J. A. Campbell Co., P. O. Box 669, Long Beach, Calif., and will be sent upon request.

9,000,000 Gas Burners to Adjust

(Continued from Page 22)

Names and addresses on the work-tickets were a transcript of the billing division's list of all customers, so that no customer would be missed. They were arranged, of course, in appropriate routes for each adjuster.

This conversion-adjustment of Chicago's 9,000,000 gas burners was begun about May 1, 1931, and completed by the middle of September. Fourteen hundred men were employed in the field work, beginning at the south limits of the city and working to the northern limits, governor-district by district. Pressures were raised in each district a few hours before the men entered, and maintained at 9 inches water pressure.

On October 16—a Friday afternoon, when most industrial business would be at a low ebb for the week-end—the new gas was turned into the mains. The volume of manufactured gas in holders had been reduced to the lowest possible point at 4 o'clock. Natural gas and coke oven gas were then mixed by automatic devices and sent out into the distribution system. During the night, when the load and send-out were at minimum figures, the holder stock was replenished with the new gas. Meanwhile, as the new gas penetrated the distribution system, pressures were reduced in step with the penetration, by re-setting the automatic governors.

By Monday morning—approximately 60 hours after the change-over began—every point of the distribution system was being supplied with the 800 B.t.u. gas, and the pressure had been gradually reduced.

Another reason for making the change-over on Friday afternoon was that meter readers could wait over Saturday and Sunday, and begin their work again on Monday when the new gas was distributed all over the city.

The Chicago change-over program as a whole eliminated the need of sending customers "warning" or "instructions" in advance—the more or less intricate and technical explanations that are so easily misinterpreted or misunderstood. The adjusters were carefully trained to be courteous as well as efficient. They rang the customers' doorbells, told the occupants they had come to give all gas appliances inspection and adjustment, finished their work, and left. Customers who inquired—and many did—were told that the adjustment was in anticipation of the new gas, which had been quite generally publicized for a year or more, and were assured that appliances would function with the new gas as with the old.

The general effect of the change-over as a whole upon customer-relations, appears to have been good, although it may be too soon to speak positively of that. While human nature is what it is—preponderantly disinclined to change of any kind—inquiries and questionings naturally follow on the heels of such a radical change. But the number of these that could be fairly called "complaints" or "kicks" has been less than expected.

There is no doubt that Chicago's 9,000,000 gas burners are in better condition generally than ever before at any one time. The gas supply is uniform in heating value and in pressure. The indications are that an overwhelming majority of Chicago gas users would not know that any change had taken place if they had not read about it in the newspapers.

As said in the beginning, the change-over program carried out in Chicago might not fit some other city. But for Chicago it seems to have been the right one.

Improve Industrial Sales and Service

(Continued from Page 30)

The more common practices of lowering rates has been reducing the price per M.c.f. in each step, where step rate is in effect, reducing the quantity of gas in each step with the price per M.c.f. remaining the same, or reducing both the quantity and price per M.c.f. of each step. Most companies have advised their customers that these cheaper rates are temporary reductions only and the rates will probably revert to the original rates in 1933.

Some companies have considered lowering their rates still further, but each time they arrive at the same barrier: A reduction in revenue that cannot be offset by additional new business.

When Service Pays

Since industrial rates appear to be established for an approximate 12-month period, our only other weapon with which to protect our industrial load is by intensive industrial service work. Companies which have maintained competent industrial sales and service departments have been able to retain a large portion of their industrial business that otherwise would have been lost, even though lower rates had been inaugurated. I am firmly convinced that our best defense against coal and oil is laid in the boiler room and beyond.

The principal duties of these sales engineers is to assist and advise plant operators in combustion control and see that the minimum quantity of gas per unit of product is used. If the sales engineer can go into a plant and decrease the quantity of gas used per unit of product or per thousand pounds of steam generated, confidence is at once established and the hearty cooperation of the plant operator in keeping down fuel costs immediately follows. In the largest plants they cannot be of much assistance, because these plants have skilled engineers in their employ but in plants that cannot afford to employ skilled engineers, these sales engineers can be of material assistance to the plant operator. Equipped with Orsat, stack thermometer, and stack loss chart based on the analysis of gas sold, these engineers can demonstrate the effect of various damper settings on the efficiency of gas firing and interpret these figures in dollars and cents loss or saving to the operator. Although the plant operator may not place much faith in the readings of an Orsat the first two or three times tests are made, it is indeed a rare occasion when he does not soon become convinced of their value and makes the request that these stack gas analyses be made regularly. A number of our customers are sold on this service to the extent that if the sales engineer is delayed in reaching his plant at the usual time, they immediately request that these analyses be made at our earliest opportunity.

Oftentimes the sales engineer's work extends beyond the boiler. Our sales engineers often conduct and assist in conducting tests to insure proper valve setting on steam engines, or natural gas engines. Using the conventional type of indicator, cards are then made and from these cards, valves are changed to better the operation of the engine. In some plants, we have had men on the job day and night in an endeavor to find out why some particular heating or steam cost appears to be out of line, and in practically all instances our work has been instrumental in uncovering these facts. When the plant operator desires to know exactly what boiler and furnace efficiency he is obtaining and is not satisfied with the efficiency as reported by the sales engineer based on heat balance from the analyses of stack gases, a complete weighed water test is conducted. If this test proves to be in line, then it is evident that the trouble lies beyond the boiler and cannot be attributed to the fuel.

Valuable contacts are made during this work, and the plant operator is very reluctant to make a change in fuels, for he is well aware of the fact that oil or coal companies do not furnish the combustion control service offered by the gas company. Should competitive fuels drop to a point where the plant operator will be forced to recognize the probable saving he will effect over gas, it is more than an even bet that he will ask the advice of the sales engineer he has become acquainted with during routine gas company inspections before definitely deciding to make a change in fuel. This affords the sales engineer an opportunity to call to the plant operator's attention all costs entering into the firing of oil or coal fuels and oftentimes these costs are such that the plant operator elects to continue using gas fuel. If the comparative over-all costs of the competitive fuel is unquestionably cheaper than gas cost, the plant operator should be given the information, because if the sales engineer misrepresents the facts in the case, and the plant opreator decides to give the competitive fuel a trial and finds it to be much cheaper, the plant operator loses faith in the gas company.

Sell New Gas Uses

The present times and conditions afford ample opportunity for development work along industrial lines. It has been the experience of most gas companies during the past few years of rapid expansion that small industrial users of gas were sometimes overlooked in their eagerness to secure the larger loads. Now, time will permit checking back over customer plants and endeavoring to interest them in using gas in other processes. If increased uses of gas can be promoted in plants now using gas, this increased revenue is practically net, as no additional investment is required to serve it.

Our company is doing everything possible to promote the installation of alfalfa dehydrating plants such as we now have on our lines near Waco, Texas, and Pauls Valley, Oklahoma. These plants are ideal industrial loads, as they begin operation in April and operate approximately 24 hours per day, using approximately 25 M.c.f. of gas per hour, and come off the line at the first frost. Once they are on the line, the possibility of losing them to a competitive fuel is very remote, because gas will permit a direct drying application, and gas also lends itself so easily to automatic control. Our company expects two

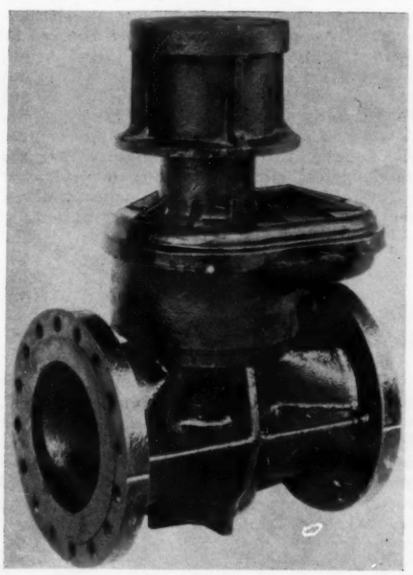
or more of the units to be built near our lines next year and possibly more if Government aid is secured in this new enterprise.

Promote Engine Load

The development of the sale of natural gas to internal combustion engines, until recently, has been sadly neglected by most companies. While the volume of gas sold per engine is not very large, it usually commands a higher average price per M.c.f. than boiler gas. After taking into account that the average engine installation can be served from lines already laid; that a properly engineered and operated gas engine plant will last 20 years or more; and that this load can be operated economically on natural gas fuel only, gas companies can well afford to cooperate with engine builders to the end that natural gas engines be located in the territory served by them. Just recently a number of the major gas companies have employed or trained engineers who devote their entire time to this promotional work. The present low load factor of industrial plants has added stimulus to this work.

Announce New Housing for Nordstrom Valves

As a measure of economy to eliminate the necessity of building expensive vaults for subsurface valve installations, a new type of housing has been developed for Nordstrom valves, to protect the gears. A cast iron gear housing and road box can now be furnished for all Nordstrom spur-gear operated



Cast iron gear housing and road box for Nordstrom spur gear operated valves

valves, according to the manufacturer. This permits burial of the valves within an enclosure that fits snugly around the operating parts. Lubrication can be supplied to the valve from the surface by attachment of a low head extension projecting to the surface from the valve. Details are included in a new catalog recently produced by the company, copies of which can be obtained by addressing the Merco Nordstrom Valve Co. at any of its branch offices or at 343 Sansome St., San Francisco.

Rehabilitation of Prescott, Ariz., Plant

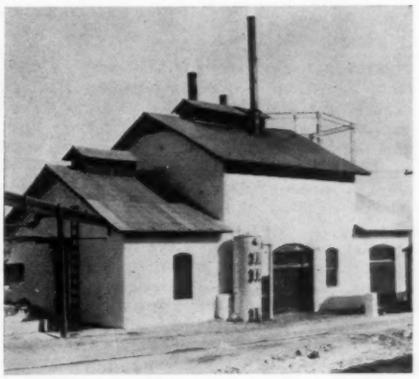
ARIZONA Power Co., Prescott, Ariz., recently completed the rehabilitation of its plant and system, according to Malcolm M. Bridgwater, general superintendent of the company, which is a subsidiary of the United Gas Improvement Co., Philadelphia, Pa. Mr. Bridgwater gives the following details of the work.

The Prescott gas plant was installed in 1905 and consists of two 4-foot 6-inch Lowe type oil gas generators, with an average send-out of 110,000 cubic feet per day, with a maximum peak during the summer months of 140,000 cubic feet. At the time the plant was constructed, several sections of the town were very sparsely settled and considerable 1-inch and 1¼-inch main was installed. The company has replaced some of this smaller sized main with 2-inch pipe, the replacement program starting in June and being completed in August. This change permits a lower pressure.

Work at the gas plant consisted of the installation of a new 4-foot x 30-foot secondary scrubber which replaced a 6-foot diameter 20-foot scrubber which has served its useful life.

Another improvement was a new steam-driven exhauster with a capacity of 10,000 cubic feet per hour to remove gas from the relief holder and pass it through the purifier boxes into the main holder. This new exhauster replaces a motor-driven centrifugal type exhauster which was of inadequate capacity.

Another addition to the plant was a new direct-connected Worthington centrifugal pump which doubles the water supply through the scrubbers and washers.



Arizona Power Co.'s gas manufacturing plant at Prescott, Ariz.

A new electric control board for the various plant motors has also been installed and a new displacement-type station meter, size 5x15 with a normal rating of 12,000 cubic feet of gas per hour.

New short center Worthington "V" belt drives were installed on the blowers used for blasting the generators and an idler was installed on the compressor, permitting closer coupling, and conserving space. In addition to this work, the company replaced two stacks on the generators, installed additional pipe coverings in the plant, and did other miscellaneous repair work.

A. M. Patten, President of Several Kansas Utilities, Dies Dec. 9

A. M. PATTEN, president of the Kansas Power & Light Co., Topeka, Kan., passed away early in December. He had been in poor health for more than a year, but the seriousness of his condition was not realized until shortly before his death. He was taken to the hospital on Tuesday, December 8, and died at 9 A.M. Wednesday, December 9, of meningitis.

Mr. Patten was born in Medford, Mass., December 19, 1876. He died in Topeka, Kan., on December 9, 1931, at the age of 54 years. He was educated in the public schools of Topeka and in Washburn College, receiving his technical education at the University of Kansas. After graduation he entered the employ of his father, who was then manager of the Topeka Railway Co. On the transfer of the properties of the L. E. Myers interests and through all other transfers Mr. Patten went with the properties until at the time of his death he controlled and operated statewide utilities valued at more than 60 million dollars.

At the time of his death Mr. Patten was president of the Kansas Power Co., the Kansas Power & Light Co., the Kansas Pipe Line & Gas Co., the United Power & Light Corp. and several other Kansas subsidiaries of the North American Light & Power Co.

The management of the companies Mr. Patten conducted will be continued by the organization. C. A. Leland, native of Kansas and for the past five years vice-president and general manager of the Iowa Power & Light Co., a subsidiary of the North American Light & Power Co., will assume executive charge of the properties over which Mr. Patten had supervision. D. E. Ackers will be elected vice-president of the Kansas Power & Light Co. and will have operating charge of the properties with which he has so long been connected and which he guided as an assistant to Mr. Patten. E. D. Bell will be elected vice-president of the United Power & Light Corp. of Kansas and will continue in operating charge of the United Power & Light Corp. E. R. Duree, with his assistant, C. E. Brock, will continue in the management of the natural gas properties and H. S. Kilby will continue as general manager of the Kansas Power Co.

R. L. Clark General Auditor for Northern States Power Co.

R. L. Clark, former assistant general auditor of the Northern States Power Co., Minneapolis, Minn., has been appointed to the position of general auditor for the company, following the election of J. J. Molyneaux as vice-president and treasurer. Mr. Clark has been an employee of the Byllesby organization for the past 22 years, going to Northern States Power Co. in 1918 first, and remaining there only a short time. He returned to Minneapolis in 1920 to become assistant general auditor of the company and has continued in that capacity until his recent appointment.

C. E. Curry, Manager of Missouri-Kansas P. L. Co., Dies

C. E. Curry, manager of the Missouri-Kansas Pipe Line Co., and vice-president of the Kentucky Oil & Gas Association, died on December 18, as the result of injuries sustained in a fall.

United Light & Power Change-Over

(Continued from Page 27)

divided into groups of five and a foreman, the latter insofar as possible being an experienced pipe fitter. A card is made out in advance for each customer, giving name and address. These cards are distributed to the various crews in the morning and at noon, and the cards turned back to the office when completed, or if uncompleted, the necessary notations made thereon.

After all adjustments have been completed, 100 per cent natural is then turned into the system. This is done through the storage holder, and again there is a period in which the heat units gradually build up as the mixed gas is exhausted. The industrial and commercial appliances are again gone over and given a complete readjustment for full natural.

On domestic appliances there is always a period of call backs for adjustments in cases of residences being closed during the change-over period, and for readjustments in cases of unsatisfactory work previously. While all domestic ranges are quite similar in construction, there is yet enough variation in construction to tax the ingenuity of the change-over men.

Ranges, hot plates, radiant heaters and the majority of storage water heaters are comparatively easy to adjust satisfactorily. The greatest percentage of appliances have adjustable orifices. On others it is necessary to replace the old plug orifices with a new one, or adopt the old cap orifices and ream them to the proper adjustment.

On some ranges we find the burners set closer to the grates than on others. This on a high flame allows the flame to impinge on the cooking utensil, which in the majority of cases gives incomplete combustion resulting in an odor being given off, and, therefore, a complaint call for a misinterpreted gas leak. We have found an almost universal demand by the housewife for a high, quick flame, an adjustment which is not the most efficient or economical. The most efficient flame is not satisfactory as it is considered too slow. This demand makes the above condition more difficult to adjust satisfactorily.

Special Difficulties

The worst difficulties are encountered with commercial appliances designed especially for manufactured gas, or on appliances such as torches, blast lamps, and laboratory burners where quality of flame is of paramount importance. There is a considerable difference in the burning characteristics of natural and manufactured gas in that the former is slower burning and requires a larger volume of air for complete combustion. Carburetted water gas requires approximately 4.5 volumes of air for complete combustion, whereas natural requires approximately 10.5 volumes. While it is true that the quantity of natural gas admitted to the burner has been reduced about 40 per cent making approximately the same B.t.u. mixture within the burner, yet the higher ratio still prevails as above given. This gives a large volume of flue gases or products of combustion, which becomes quite a serious problem in converting certain types of commercial appliances. Due to the design of the appliance, it is in a good many cases very difficult to ventilate the burned gases away from the burner rapidly enough for satisfactory operation. This is characterized by the flame rising off of the burner and floating away. This gives a certain percentage of incomplete combustion and the formation of gases which have a characteristic odor and are very irritating to the eyes. This condition naturally brings complaints from the customer, and he is perfectly justified in complaining, for it is a more or less hazardous condition.

The appliance must in all cases be sufficiently reconstructed to admit of complete combustion or the required amount of heat is not produced to supplement former operating conditions. The slower rate of flame propagation results in considerable difficulty with other types of commercial burners which have small gas ports. We have had burners which, of course, operated perfectly on manufactured gas having a large percentage of hydrogen with its high rate of flame propogation, yet on 100 per cent natural it was impossible to hold the flame on the ports even at a greatly reduced rate. This necessitates enlarging the ports to reduce the velocity of the gases. On most burners this is comparatively easy, but on the preheated secondary air type, it is a more difficult procedure.

On dental, Neon sign, radiator and battery equipment, we have had the worst difficulty in obtaining satisfactory replacement equipment. On torches especially, the slow rate of flame propagation of natural gas became a very troublesome factor. Torches designed for manufactured gas cannot be used at all. Neither were there any of the natural gas torches tried out in the beginning found to be 100 per cent satisfactory. Some of these torches appeared to give an ideal flame when first observed, yet when tried out in the dental laboratory they would be unsatisfactory. The principal difficulty with these was that they were too slow, resulting in over-heating the crucible in some cases, and at the same time not resulting in a sufficient amount of heat in the alloy to allow it to be transferred to the mold before cooling sufficiently to give an incomplete casting. Again there is required a very hot and sharply defined flame for soldering. This flame must be rapid enough and fine enough so that in soldering bridge work the metal being soldered is not injured. This same condition is a very vital factor in automobile radiator shops. We have had very fine cooperation from a manufacturing company in Denver, Colo., and now have what we believe is going to prove a very satisfactory torch.

All of these torches are operated with compressed air, which imparts a high velocity to the mixed gases in the barrel of the torches and which becomes a necessary and important factor in producing a long, slender flame. This results in the necessity of designing the torches with a very efficient pilot. This special tip or pilot is the part which has called for the greatest skill and ingenuity in the design of an efficient torch. The flame must be steady, and "blowing" cannot be tolerated, for this reduces the flame temperature. If a small air compressor has formerly been used without an air receiver, it becomes necessary to insert a small air tank in the line between compressor and torch.

Some dental laboratories insist on a more rapid method of soldering, and have on manufactured gas used a mixture of oxygen and air on their old torches. Torches are now available for use with natural gas and oxygen, or admixtures of air and oxygen which are very satisfactory.

Equipment for the Neon sign plants is also operated with compressed air, and while the burners are quite often in clusters, they are very similar to the torch tips. Other burners are of the ribbon type, and these are generally equipped with a screen. This admits of a greater percentage of primary air, the screen eliminating a flash back into the throat of the burner. With this kind of equipment it is generally advisable to purchase new parts designed to operate on natural gas.

We also experienced a great deal of difficulty in the beginning with laboratory burners such as the Bunsen type. In the majority of cases these burners were designed with narrow barrels, and while very satisfactory on manufactured gas, yet for full natural the velocity of the air gas mix through the barrel is too great for the rate of flame propagation, resulting in the flame blowing out. This is overcome by increasing the diameter of the barrel, or fitting an outer sleeve to the tip of the barrel. Holes are drilled admitting gas to this outer chamber, which results in a pilot of very slow velocity gas around the complete circumference of the barrel.

Conclusion

In conclusion, it must be remembered that all industrial, commercial and domestic equipment encountered in changing from manufactured to natural gas has been designed to operate properly for a very much lower B.t.u. gas, and one that is much faster burning. You cannot, therefore, lay down any set rule for readjustment on the industrial and commercial burners especially, but simply abide by the theories of combustion and apply them insofar as possible in the redesign of this type of equipment.

We have also concluded since going through a number of change-overs, that the best policy is not to give too much publicity to what is being done during the change-over. The customer should, of course, be notified of the time the change is to begin, and that the adjusting crew will reach them at the earliest possible date. They should be advised, of course, to turn the burners down, and if possible not to use their ovens. We believe that too much publicity has the psychological effect of causing the customer to look for trouble, thus producing unnecessary calls during the change-over period.

George Humphrey on Trip to Coast in December

George Humphrey, sales manager of the General Gas Light Co., Kalamazoo. Mich., visited sections of the Southwest during December, en route to the Pacific Coast where he visited with C. B. Babcock, Pacific Coast manager for General Gas Light. He returned to Kalamazoo late in December, the trip being made by motor.

Canadian Gas Assn. to Meet in Winnipeg June 9-10, 1932

Canadian Gas Association announces that its 25th Annual Convention will be held June 9 and 10, 1932, at Winnpieg, Manitoba. Fort Garry Hotel has been selected as headquarters.

Merrill Joins Sales Dept. of Council Bluffs Gas Co.

E. E. Merrill, of Fort Worth, Texas, has been appointed to the sales department of the Council Bluffs Gas Co., Council Bluffs, Iowa.

the first

complete line of really fine quality gas ranges . . . . . at such sensationally low prices

PRODUCT OF THE WORLD'S LARGEST STOVE PLANT

Detroit Jewel Garland

GAS RANGES FOR 1932

The Buffet

A big range for a small space. Especially adaptable for apartments and small kitchens. Ideal as a sales leader.

The Master

A modern console type gas range. A most remarkable range at the price.

The Table Top

With an unusually large top. No other range offers so many important features.

The De Luxe

Built to up-to-date requirements. Especially to suit the taste and pocketbook of the housewife who wants a range beautiful in design and complete in equipment.

The Super De Luxe

A gas range for women who want the finest. It has the largest cooking top of any console type range on the market and is fully equipped with modern accessories.

1932

will reward those who give the people what they want at a price they can afford to pay . . . We have built our 1932 line to suit the public taste and the public pocket-book . . . with full legitimate profit for you in every deal . . . . . Write for catalog and discounts

Detroit-Michigan Stove Co.

Detroit, Michigan

Circulating Heater Sales Campaign

By Graydon A. Milton

Secretary San Francisco Unit, Gas Appliance Society

THE San Francisco Unit of the Gas Appliance Society under the leadership of President S. W. Newman has just completed a successful sales campaign on circulating heaters.

It was decided to hold a campaign on this appliance on account of the wide potential market for circulating heaters in the San Francisco area and because not only the heating dealers but the department and appliance stores could tie in with this drive.

Regarding the potential market for this type of appliance it might be of general interest to know that, according to a survey made by the Pacific Gas and Electric Co., when the city of San Francisco was cut over to natural gas, 67,408 homes out of 91,789 were without central heating plants. This shows the wide market for small heating appliances.

The committee chosen to formulate plans for this campaign decided to have an extensive showing of billboards featuring the campaign slogan "Warmth without Work," and displaying the seal of the Society. Half of these billboards were illuminated and they were scattered throughout the entire city so that the message would be as widespread as possible.

To encourage newspaper advertising during the entire campaign, which lasted one month, it was decided to offer a cash prize of $25 for the best newspaper advertisement appearing during the campaign period. Newspaper advertising was to be individual in character and run in any newspaper and on any day the dealer might choose. Accompanying this advertising were special publicity releases written in the form of news items which were run in the daily and weekly newspapers to further stimulate interest in this type of heating. Competition was very keen and resulted in 1397½ inches of newspaper advertising on circulating heaters run in the four daily papers in San Francisco during the month of November.

Another $25 prize was offered to the dealer having the most attractive window display featuring circulating heaters during the month of November. This resulted in 19 circulating heater windows in the leading department and appliance stores during the month.

The prize winning advertisement and one of the prize winning window displays are shown in the illustrations, and according to the judges the winners were hard to decide on account of the number and quality of pictures and cuts submitted. The windows and advertising copy were judged by a committee from the San Francisco Ad Club.

The committee planning the campaign also decided to have posters made, exact duplicates of the billboards which were used in windows of department stores and participating dealers' stores. The billboard urged the public to "buy from dealers displaying this sign" and the tie-in was very effective.

The Pacific Coast Gas Association assisted in making the drive a success by including in the weekly broadcast a message helpful to the campaign.

The results of this campaign were carefully checked from confidential reports from the dealers and the combined sales from all dealers show that 468 circulating heaters were sold during November, an increase of 270 per cent over the previous month.

The window display by Lachman Bros., San Francisco, tied for first place with one of the Spark Stove Shop. The Lachman display is shown above, while the one featured by Spark Stove Shop was carried on page 45 of the December issue of "Western Gas."

NATHAN-DOHRMANN CO
On Thanksgiving Day Will Your Guests Exclaim..
"The Dinner Was Great... But Their House Was Cold"
Instead of fire-making, soiled walls and draughty rooms . . . enjoy the convenience and cleanliness of natural gas heating at its best. Select a modern, free-of-care circulating heater. Here you will find 4 makes and 8 sizes displayed. All are approved by the American Gas Association.
Wedgewood Circulating Heater
$48.50
It heats quickly, safely and cheerily! This handsome cabinet-type heater looks well in any living or dining room. The beautiful porcelain finish has the appearance of grained walnut. 2-room size, $48.50. 3-room size, $58.50.
Use Our Budget Plan
Other Heaters
No. 500 Tropic Air $23.50
No. 2 Fraser $39.50
No. 3 Fraser $89.00
No. 25 Fraser $49.50
No. 35 Fraser $59.50
No. 61 Heatola $46.00
NATHAN-DOHRMANN CO

Nathan Dohrman Co. won first place for newspaper advertising copy in the San Francisco circulating heater campaign.

Appraisal of Lone Star's Texas Properties

APPRAISAL of Lone Star Gas Co. properties, ordered by the Texas Railroad Commission, was begun early in December by Hawley, Freese, and Nicholas, consulting engineers of Fort Worth, Tex., who were awarded the contract by the commission on December 2. The purpose of the evaluation is to enable the Commission to determine reasonable gate rates for gas in Texas.

Bid for the appraisal was made on a per diem basis, not to exceed $45,500, and is expected to be completed about April 1. The work involves the appraisal of about 4,000 miles of transmission and gathering lines, producing properties, compressor and measuring station buildings and various other units of property.

It also includes an audit of the books of the company for the past two years. This work will be sublet by the Fort Worth firm to Rogers, Smith & Co., Fort Worth and San Antonio accountants, and to J. A. Phillip Co., Houston.

The survey will not include valuation of subsidiary distribution companies of the Lone Star, but only the properties of the company's transportation system and wells. This will leave the cities served by the Lone Star to work out their own valuations of properties within city limits.

Ordinances recently adopted by several Texas cities to lower gas rates have been set aside by the Texas Railroad Commission pending its investigation of gas rates.

The Railroad Commission, gas utilities division, intends to make a detailed physical appraisal in connection with its valuation.

The Texas law limits the return to 10 per cent on the "actual cost of physical properties, equipment and betterments."

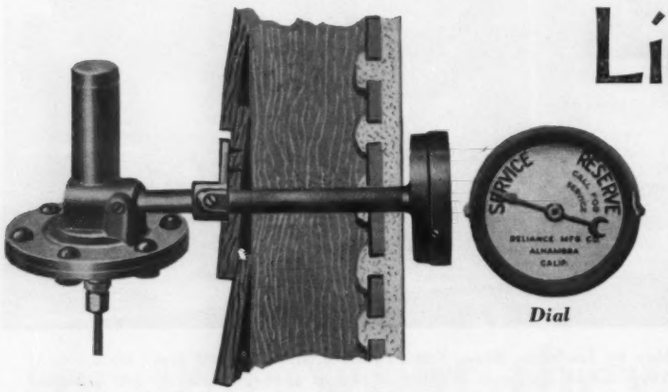
But in the valuations it was expected that replacement cost will be used as the standard. This figure approximates cost on present price levels less actual depreciation. Replacement valuation takes into account a factor of value as a "going concern," which will be allowed by the courts.

Wedge Goes With Northern Gas and Pipe Line Co.

H. E. Wedge, sales supervisor for the Council Bluffs Gas Co., Council Bluffs, Iowa, resigned to accept a position with the sales department, of the Northern Gas and Pipe Line Co., Omaha, Neb.

RELIANCE

Liquid Petroleum Gas Regulators

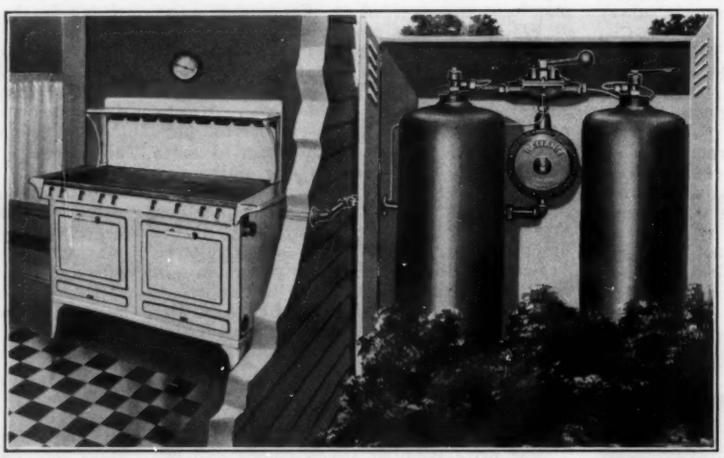


Dial

Indicator Assembly

For Absolute Pressure Control of Bottled Gases

This type of control makes it extremely convenient for the customer and never allows him to be out of gas and insures a service as constant and dependable as any natural or manufactured gas company can offer their customers.

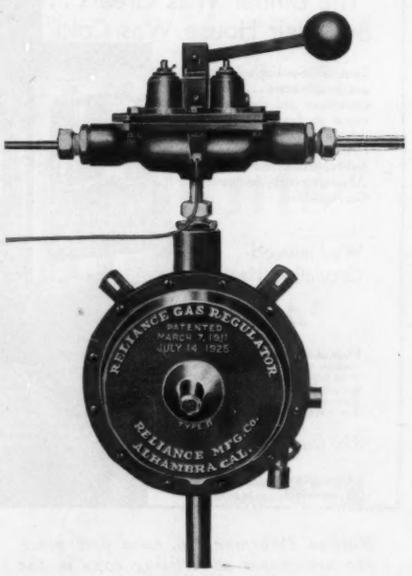


Completed Installation

- Automatic control
- Two step regulation
- Indicates cylinder operating
- Two cylinder operation for excessive demands
- Positive lockup
- Multiple cylinder installations

The type "MR" regulator is in reality a duplex regulator, reducing extremely high pressures encountered in the service cylinder when first installed, to a uniform outlet pressure varying from three to six pounds, thereby enabling the secondary, or Type "B" regulator, to work under normal, reasonable conditions at all times, insuring uninterrupted service to the appliances without pressure fluctuations.

Also a complete line of gas regulators for Manufactured and Natural Gas Services



Type MR and B Regulator Assembly

RELIANCE REGULATOR CORPORATION

ALHAMBRA, CALIFORNIA

SALES — SERVICE

NORTHWEST GAS & ELECTRIC EQUIPMENT CO., Portland, Oregon
AMERICAN METER COMPANY—New York, Chicago, Pittsburgh
JOHN J. GRIFFIN & COMPANY—Philadelphia
HELME & McILHENNY, Philadelphia
MARYLAND METER WORKS—Baltimore
WESTCOTT & GREIS, INC., Dallas, Texas; Tulsa, Oklahoma
D. McDONALD & COMPANY—Albany
METRIC METAL WORKS—Erie, Denver, Kansas City
NATHANIEL TUFTS METER WORKS—Boston
PACIFIC METER WORKS—Los Angeles, San Francisco
RELIANCE REGULATOR CORPORATION—Alhambra, Calif.

BUTANE - PROPANE NEWS
Covering Liquefied Petroleum Gas Service

Dehydrating Commercial Propane

By K. H. HACHMUTH

Philgas Company
Research Engineer

COMMERCIAL PROPANE, more commonly referred to as "bottled gas", invariably contains appreciable amounts of dissolved and often entrained water unless it has been subjected to special dehydration treatment. The removal of this water becomes an imperative necessity if uninterrupted fuel service is to be assured, since this water-saturated product has been shown to give considerable trouble when it is used in cold weather. Experience has demonstrated that at temperatures between 25° F. and 35° F. conventional propane pressure reducing regulators tend to "freeze up" when operating on the vapors distilling from a water saturated product. This trouble has been traced to the refrigerating effect obtained on expanding the vapors through the regulator valve which results in the valve becoming colder than the surrounding atmosphere, whereupon a partial condensation from the water-saturated propane vapor takes place on the upstream side of the valve. Since liquid propane will dissolve only a small proportion of the water contained in saturated propane vapor, most of the water condensed with the propane remains behind as ice while the liquid propane blows through the valve and is vaporized on the downstream side. The ice deposit gradually builds up as the regulator is used until the valve is so effectually blocked with ice that it will no longer operate.

The difficulties just reviewed, together with the observations made in their connection, presented three more or less distinct problems for special investigation. First of all, it was necessary to determine the vaporization characteristics of solutions of water in propane; secondly, an economical process for accomplishing the dehydration had to be devised; and lastly, satisfactory methods of analysis adaptable to the routine handling of such products had to be developed. The results of these investigations are presented and reviewed in this article.

Vaporization Characteristics of Solutions of Water in Propane

In order to make a critical study of the causes of difficulties as encountered in the utilization of water-saturated products, data were required on the relationship between the concentration of water in propane vapor and the concentration of water in the liquid propane which is in equilibrium with the vapor. An apparatus devised for the purpose of obtaining this information consisted of a 1-gallon container surrounded by a constant temperature water bath. The outlet of the container was fitted with an expansion valve which discharged through a coil of glass tubing immersed in a bath of liquid propane. The outlet of the coil was connected through a meter to a source of vacuum.

In operation the 1-gallon container was filled with a sample of commercial propane containing dissolved water but no free water. The expansion valve was opened slightly so that the contents of the container would slowly distill off at a constant temperature. The vapors, after having been expanded to a pressure slightly below atmospheric, passed through the glass coil where practically all of the water vapor was frozen out. Since the freezing bath consisted of liquid propane boiling under atmospheric pressure, it was not cold enough to condense the vapors which were passing through the coil under a reduced pressure. The vapors leaving the freezing coil were passed through the meter into the source of vacuum.

At periodic intervals the test was stopped and the glass coil weighed to determine the amount of water collected. The coil was then dried and the test continued. In this manner a full record was obtained of the concentration of water in the propane vapor during the vaporization of the contents of the container. The small amount of water carried past the freezing coil by the vapor was calculated and added to the amount weighed. The total water found gave the amount of water originally present in the propane, from which the per cent of water in the original liquid could be calculated. Likewise, the per cent of water in the liquid at the end of any interval could be determined. From these data two curves were constructed, one showing the concentration of water in the liquid versus the percentage vaporized; the other, the concentration of water in the vapor against percentage vaporized.

Upon studying these curves it became apparent that the per cent of water in the vapor was directly proportional to the per cent of water in the liquid at any one temperature. That is, expressed as an equation:

$$\frac{V}{L} = a \qquad (1)$$

Where V = per cent of water in the vapor

L = per cent of water in the liquid

a = constant dependent on temperature

This relationship allows the writing of an equation showing the concentration of water in the vapor at any time during the vaporization.

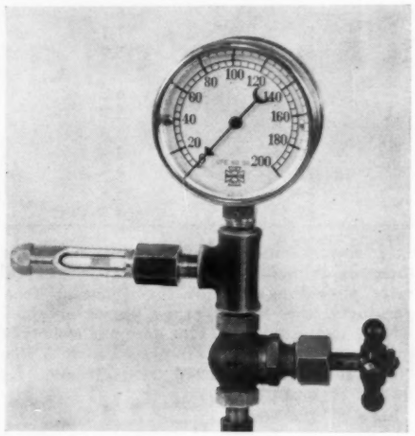


Fig. 1.

$$V = e^{(1-a)\log e\,(100-X)+C} \qquad (2)$$

Where e = 2.7183
x = per cent vaporized
C = constant of integration
V, a = defined above

The constant ratio, concentration of water in the vapor to concentration of water in the liquid, allows the prediction of the solubility of water in propane. Propane vapor saturated with water will be in equilibrium with propane liquid saturated with water. The amount of water carried by saturated propane vapor will be for all practical purposes equal to the vapor pressure of water divided by the vapor pressure of propane and multiplied by 100, when expressed as mol per cent.

$$100\frac{W}{P} = \text{mol per cent of water in vapor} \qquad (3)$$

Where W = vapor pressure of water
P = vapor pressure of propane

This can be converted to per cent by weight by multiplying by $\frac{18.}{44.}$ This is an approximation, but exact enough for this purpose. Per cent by weight of water in saturated vapor =

$$100\frac{W}{P}\times\frac{18}{44} = \frac{41W}{P} \qquad (4)$$

Since the per cent of water in the liquid is proportional to the per cent in the vapor, the per cent of water in saturated liquid propane is:

$$S = \frac{1}{a}\times\frac{41W}{P} = \frac{41W}{aP} \qquad (5)$$

S = solubility of water in liquid propane per cent by weight

$a = \frac{V}{L}$ as before

This solubility applies to the temperature at which the values of W, P and "a" are chosen.

Eleven tests were run to determine the value of the ratio "a" at several temperatures. The average results obtained in these tests are presented in Table No. 1.

Table No. 1. Determined Values of Ratio "a"

Temperature °F.	Ratio (a) $\frac{V}{L}$
40	6.7
50	7.1
55	6.7
60	6.7
60	6.2
65	5.9
70	5.6
70	5.4
78	4.9
80	5.6
87.5	4.9

It was found that if the reciprocals of these experimentally determined "a" values were plotted against the corresponding temperatures, the best average curve obtained was a straight line. The data, as smoothed by this average curve, are presented in Table No. 2 for several selected temperatures. By means of formula (5),

$$S = \frac{41W}{aP}$$

the solubilities of water in liquid propane at these various temperatures have been calculated with results as shown in Column 3.

Table No. 2. Estimated Solubilities of Water in Propane for Various Selected Temperatures

Temperature °F.	Value of Constant "a" (Ratio of $\frac{V}{L}$)	Estimated Solubility of Water in Propane in Per Cent by Weight ($S = \frac{41W}{aP}$)
32	....	.006
40	8.3	.008
50	7.1	.011
60	6.2	.016
70	5.6	.022
80	5.0	.029
90	4.5	.038
100	4.2	.049

Dehydration of Commercial Propane

The vaporization characteristics of solutions of water in propane at once suggested a simple method of dehydration and, as will presently be demonstrated, distillation or more properly fractionation is the most efficient method for accomplishing the desired result. In the usual course of manufacture, commercially pure propane is removed as an overhead product from a fractionating column. As such, it invariably contains both dissolved and free water. However, if this propane is again fractionated after removing all free water, it can be obtained absoluately dry as a kettle product with very little loss of propane. This further fractionation also serves to remove most or all of the ethane originally present. The efficacy of this method of dehydration has been amply demonstrated in the commercial scale operations of the Phillips Petroleum Co., where all of the propane produced for the past three years for its subsidiary, Philfuels Co., has been successfully treated for water removal by this process.

Neglecting the ethane, which complicates the problem but does not essentially change it, the probable percentage loss of propane during the dehydration process can be easily shown. Let us assume that the wet propane is stored in tanks at 90° F. These tanks can be so arranged that all free water may be drained off and propane containing dissolved water only drawn from the tanks. Table No. 2 shows that propane saturated at 90° F. will contain 0.038 per cent of water or, in other words, 100,000 pounds of propane will contain 38 pounds of water. Let us furthermore assume that the dehydrating column is operated at 120° F. and that the efficiency is 80 per cent, that is, the overhead vapors will be 80 per cent saturated with water. The calculated amount of water saturated propane vapor can contain at 120° F. is 0.29 per cent and 80 per cent of 0.29 is 0.23 per cent. Consequently, 1000 pounds of propane vapors will carry off 2.3 pounds of water and it follows that 16,500 pounds will carry over 38 pounds of water. Therefore, it will be necessary to distill 16.5 per cent of the propane overhead in order to dehydrate the remainder.

Other conditions remaining the same, it can similarly be shown that operating at 100° F. will require 23 per cent distilled overhead, at 140° F. 12 per cent overhead, and at 160° F. 9 per cent overhead. In actual practice, a large proportion of this overhead loss will be ethane which is undesirable in any case.

In the commercial application of this process fractionators not equipped with reflux accumulators can be most economically operated by using partial condensers on the overhead product. The condensed overhead can then be returned to the wet feed stock tank and the uncondensed overhead containing most of the ethane discarded.

Fractionators equipped with reflux accumulators can be operated with practically no loss, except for that necessary to remove the ethane. Supposing we have such a fractionator operating with the overhead vapors at 105° F. and that the propane in the reflux accumulator is at an average temperature of 100° F.; consider all other factors to be the same as in the previous problem and neglect the effect of ethane. The calculated amount of water saturated propane vapor can carry at 105° F. is 0.227 per cent and 80 per cent of this is 0.182 per cent or 1.82 pounds of water per 1000 pounds of propane vapor. Table No. 3 shows that liquid propane at 100° F. can contain only 0.049 per cent of water or 0.49 pounds per 1000 pounds of propane. The difference between the 1.82 pounds of water in the vapor and the 0.49 pounds in the liquid must separate as free water in the reflux accumulator, that is, $1.82 - 0.40 = 1.33$ pounds of free water formed per 1000 pounds of reflux. The reflux accumulator can be so arranged that this free water can be drained off and discarded and the reflux returned to the column containing practically no free water. In this manner, all of the water can be removed from the propane by draining it from the reflux accumulator. To completely dry the propane by this method will require the return of 28,600 pounds of reflux per 100,000 pounds of feed, if the feed contained 0.038 per cent of water. No propane will be lost by this method, since it will not be necessary to take off any overhead product. The presence of ethane will change these figures slightly in that some ethane and propane will have to be discharged as overhead product. Likewise, the presence of considerable ethane will change the per cent of water in the liquid and vapor phase because of difference in solubility.

Detection and Estimation of Water in Propane

Water in propane may be determined by the method described in the first part of this article. The process, however, is long and tedious and requires a skilled technician. It is certainly not suitable for plant control work. In the course of this investigation, considerable experimentation showed that cobalt bromide, if properly applied, was particularly well suited as a water indicator. This salt has the property of changing color with changes in humidity of the gas or vapor surrounding it. Each color change occurs at a definite per cent relative humidity, that is, at a definite per cent saturation of the vapor or gas with water. A certain color of the cobalt bromide indicates that the vapor or gas surrounding it has a certain per cent saturation with water vapor. Table No. 3 shows the observed colors of cobalt bromide on white cotton (its supporting medium) at various per cents saturation with water of the vapor surrounding the cobalt bromide.

Table No. 3. Observed Color of Cobalt Bromide Indicator Versus Corresponding Per Cent Saturation With Water of Surrounding Gas

Color	Per Cent Humidity
Green	Very dry
Blue	From nearly 0% to 30%
Lavender	From 30% to 52%
Pink	From 52% to 100%

The values in this table were determined by a series of tests on propane vapor containing various amounts of water over a temperature range of from 35° to 70° F. The per cents at which the changes of color take place seem to be somewhat affected by temperature. However, the determinations were not accurate enough to assign closer values in the table. There seems to be still another color change than those listed. This change takes place somewhere around 20 to 25 per cent humidity and is from a light blue on the dry side to a dark blue on the wetter side. This slight change in color has proven deceptive and for this reason is not listed. The green color is rarely obtained in practice. Only one case in which it was observed has been so far recorded.

Since the per cent saturation of propane vapor with water is proportional to the per cent saturation of the liquid with which it is in equilibrium, any determination of the per cent saturation of the vapor automatically gives the saturation of the liquid. Obviously, therefore, a method of contacting cobalt bromide with propane vapor under conditions the same or nearly the same as those of the liquid from which the vapor is drawn will indicate the per cent saturation with water of the propane liquid. A simple piece of apparatus has been perfected to accomplish this. (See Fig. 1.)

This apparatus consists essentially of a glass tube containing a wad of cotton impregnated with cobalt bromide. One end of the tube is fitted with a standard pipe connection (⅛ in.) and the other end with a fine capillary orifice. The glass tube is surrounded by a metal shield for protection. Portions of the shield are cut away so that the indicating cotton may be easily observed.

The method of using this indicator is simple. For instance, supposing it is desired to find the saturation with water of a cylinder of propane. It is assumed that the cylinder is at atmospheric temperature. The indicator

(Continued on Page 62)

The Dalles Plant Scheduled For Completion Early in 1932

ACTIVE construction work began November 12 on the new air-butane gas plant and distribution system being built by Natural Gas Corp. of Oregon at The Dalles, Ore.

This is the most recent construction to get under way in the air-butane field on the Pacific Coast. This new plant will be of the same general design and operation as those already in service by the company throughout the Pacific Northwest and it is anticipated it will be ready to go into action shortly after the first of the year. All construction work is being done under the direction of Standard Management and Operating Corp. with J. H. Lane in charge as resident engineer.

It is estimated by company officials that at least 200 consumers will be on the lines within a short time after the plant is cut over, with a total of approximately 500 consumers by the end of the second year.

Although the general topography of The Dalles is hilly, very little difficulty has been encountered in the construction of the distribution system and it has been possible to use the ditching machine for practically the entire job, although short rocky stretches were dug by hand.

All of the pipe used is wrapped steel. Storage holders will consist of one liquid gas tank of 15,000 gallon capacity, with two finished gas holders of 12,500 cubic feet each.

The plant will have a capacity of 7,200 c.f. per hour while approximately 45,000 feet of high pressure main will be necessary to take care of the immediate demand for gas service.

The building will be of sheet metal construction, rather than tile as has been previously used, and will be 30 feet long, making room for a second compressor. It will be divided into two rooms, one for the calorimeter control apparatus and the second for the vaporization and carburetion equipment, which will be similar to that already in use in plants of the company.

As is true in these plants, the necessary heat input for vaporization will be controlled by pressure conditions in the liquid storage tanks. A portion of the heat of vaporization will be supplied by a heat exchanger underneath the tank, through which the hot compressed gas passes on its way to the storage holder. Where this is not sufficient, an electric heater is operated entirely by pressure within the storage tank, while auxiliary equipment is also being installed, known as the "bubbling system." This consists of the passage of the finished gas through the liquid in the storage tank, which by means of agitation promotes vaporization

An active sales organization is already at work under the direction of P. C. Rollins.

West to Manage More Territory; Rash Named Mgr. at Jewell City

R. J. West, manager for Union Public Service Co. at Smith Center, Kan., has recently had Lebanon and Esbon added to his territory. Harvey Rash of the same company has been transferred from Lebanon and is placed in charge of the territory comprised by Jewell City, Glen Elder and Cawker City.

Carter Oil Co. Gets Contract for Supplying Two Harbors Plant

Carter Oil Co., Tulsa, Okla., was low bidder on a contract for supplying butane gas for the municipal plant at Two Harbors, Minn. The plant was scheduled for completion some time in December.

SCAIFE

LIQUEFIED PETROLEUM GAS

CYLINDERS

MANUFACTURED AND TESTED TO MEET INTERSTATE COMMERCE COMMISSION SPECIFICATIONS

WM. B. SCAIFE & SONS, CO.

OAKMONT, PA.

NEW YORK PITTSBURGH CHICAGO

LEADERS IN AIR BUTANE DEVELOPMENT ON THE PACIFIC COAST

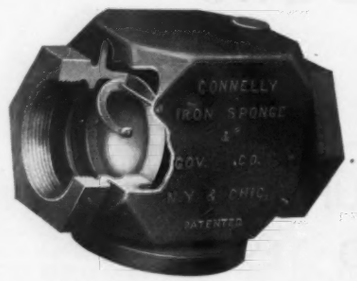
▼

NATURAL GAS CORPORATION OF CALIFORNIA
NATURAL GAS CORPORATION OF WASHINGTON
NATURAL GAS CORPORATION OF OREGON

San Francisco and Portland

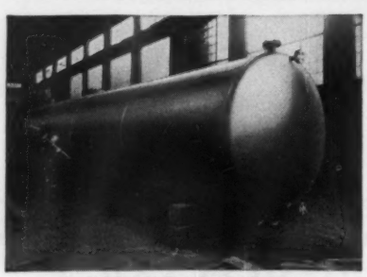
Connelly Iron Sponge & Governor Company

Automatic Balance District
High or Low Pressure
Back Pressure Valves
Photometers Testers
Siphon Pressure Gauges
Telemetric Gauges
Street Dep't Requisites
Lockwood Safety Valves
Gas Works Equipment
Gas Screens
Gas Tape
Combination Valve
Caloroptic Calorimeter
Counter-Balance Man Hole Cover
Safety-Syphon Seal



BACK PRESSURE VALVE
1/2" TO 36"
Write for Bulletins
ELIZABETH NEW YORK
CHICAGO

.Biggs. Welded Vessels



WELDED BUTANE RECEIVERS

BIGGS Welded Butane Receivers effect a real economy by eliminating the maintenance trouble and expense usually encountered under severe working conditions. The Biggs weld is ductile, uniform, and stronger than the plate itself. Data upon request.

THE BIGGS BOILER WORKS CO., Akron, Ohio

Househeating and Waterheating Campaigned in California

By E. M. LINDSEY
General Manager
Natural Gas Corporation of California

ALMOST successful three months campaign for the sale of gas heating appliances has just been completed by Natural Gas Corp. of California, with 214 per cent of the quota sold.

This was known as the "Gas for Home Comfort" campaign, beginning the middle of August and concluding the middle of November. Regular prices were maintained throughout, with no extra inducement offered other than that heating appliances could be obtained and installed with the regular down payment and no further payments need be made until November 1. Many heaters were sold on this basis during the late summer months, making it possible to get these installations out of the way before the usual fall rush.

E. M. Lindsey

F. H. Rhodes of El Centro District was declared the winner of a $25 prize for selling the highest number of heating units during the campaign period, with a total of 58, followed by J. C. Slaven of Calexico, who sold 43.

The prize for the highest estimated M.c.f. load added by heating equipment during this period was won by Clarence Josselyn of Rio Vista and Isleton, who sold appliances with an estimated annual consumption of 3,054,000 cubic feet.

Calexico District employees are the proud possessors of the sales trophy presented at the close of each merchandise campaign to the district making the highest percentage of their quota. This trophy will become the permanent property of the first district to win it three times.

The majority of the sales made during the "Gas for Home Comfort" campaign have been circulating heaters, floor and wall furnaces and radiant type heaters, due to the fact that gas service is new in the majority of these communities and as the gas is of 550 B.t.u. value, it is not generally practical to use it for central heating installations. Nevertheless, a number of commercial and central heating installations have been made, all of which are proving highly satisfactory.

It is interesting to note that these heating installations represent the sale of approximately one heating unit for every 12 meters connected at the time the campaign got underway which is an excellent showing and should result in a material increase in load.

Personal efforts of the salesmen and employees in each district were augmented by general direct mailings from time to time during the period of the campaign, and by special mailing pieces to live prospects turned in by employees. Newspaper advertising of a general educational nature introducing the various advantages to be gained by use of gas for heating were run once each week. Window and floor displays were used to attract attention to gas heating.

General news stories were also run in the local papers, calling attention to the advantages of gas heating, and the special terms available during the campaign.

To increase the interest of employees in selling househeating equipment, a bonus of $1 each was paid for each prospect turned in and sold a radiant type heater or gas steam radiator, $2 for circulating heaters, $3 for floor furnaces and $5 for furnace heaters. Salesmen were paid their regular commission in househeating sales, in addition to the employee bonus and the two major prizes awarded at the close of the campaign.

GAS has solved our fuel problems . . .
IT provides an instant, dependable heat any time of the day or night. + The automatic control does away with watching, while the flexibility of gas gives us any heat desired—slow, fast or any speed between. + Gas is clean and easy to use—the ideal fuel for cooking, refrigeration, air and water heating — and IT COSTS SO LITTLE!
PREPARE FOR COLD, CHILLY DAYS by installing gas heating equipment now — only regular down payment needed and no further payments until November 1st. Investigate our special plan today.
NATURAL GAS CORPORATION
OF
'HONE
STREET

Advertising copy run during the househeating campaign featured the theme of "Gas for Home Comfort."

Special mimeographed sales bulletins were issued to all employees once each week giving a detailed standing of each district and each salesman and local representative in relation to quotas and other districts of the company. First announcements were issued as though coming from the "Gas for Home Comfort" Broadcasting Station, with the employee in the lead as announcer. When this feature began to lose interest, the scores were given in the manner of the leading sports events at that time, including football and the world series baseball games, which helped to keep

THE IDEAL BATH
A comfortable room and an abundance of hot water...
BOTH assured, if you use
GAS!
...Gas gives speed and dependability, coupled with automatic control.
INSTALL GAS HEATING EQUIPMENT NOW WITH ONLY USUAL LOW DOWN PAYMENT AND NOTHING MORE UNTIL NOV. 1st
NATURAL GAS CORPORATION
OF
STREET
PHONE

Advantages of instant hot water were stressed in newspaper advertising copy.

enthusiasm at a high pitch. Good play for the campaign was also given in the weekly issue of "The Torch," employee house organ published by the company.

With the advent of the fall months, interest in water heating began to increase in the Imperial Valley, due to the fact that many local residents were returning to the Valley for the winter season. For this reason it was determined to run a special water heater campaign in this district, which includes El Centro, Brawley and Calexico, in conjunction with the Gas for Home Comfort campaign, which was also attracting a great deal of attention among those returning for the winter. This was limited to a four weeks concentrated effort, with a total of 82 water heaters sold.

Company officials feel that this is an excellent showing, due to the fact that there were only approximately 2,600 meters in the entire territory at the beginning of the campaign. A number of these water heaters were of the automatic storage type and will represent a good load for the company, even during the hot summer months.

F. H. Rhodes, salesman at El Centro, also took first prize in this sale with the highest number of individual units sold by any local representative or salesman during the four weeks period, selling 50 of the 82 units sold.

An employee bonus of $2 for tank water heaters and $3 for automatic storage heaters was paid, in addition to regular commission to salesmen.

Special newspaper advertising was carried each week, featuring the advantages of instant hot water service, and special mailing pieces were sent to all live prospects. Regular prices and terms were maintained, and during this period the company put into effect their ruling to allow 25 feet of free gas house piping for a water heater installation.

Gas has been available in Brawley and Calexico for only slightly over a year, and it is very encouraging to note the number of residents in these communities who were quick to take advantage of this new fuel immediately on their return to the Valley for the fall and winter months. Gas has been available in El Centro for a number of years, but the construction of the new air butane plant, replacing the oil gas plant, should also aid in materially increasing the number of consumers in this district during the next few months.

Coos Gas Co. Plant Construction to Start Apr. 1; Complete in Oct.

The Coos Gas Co., headquartered in Berlin, N. H., was recently granted a franchise for the service of butane gas in Berlin and Gorham, N. H. Berlin has a population of 22,000, and Gorham, 3,000, both cities to be served from the same plant. Work on installing the plant and distribution system will begin about April 1, and is scheduled for completion on October 1.

Ovide J. Coulombe is president of the newly organized company, J. A. Vaillancourt is treasurer, Gilman Chapman, clerk. Directors are T. H. Samson, Eli J. King, George U. Duval, Oscar A. Dupont and Theodore Morin, all of Berlin.

Bottled Gas Assn. to Meet Jan. 12 in New York

THE January meeting of the newly created National Bottled Gas Association is to be held in New York, probably on January 12, according to Association officials.

The meeting will be of one day's duration, consequently only the most important matters vital to the organizations' future activities will come up for discussion. Heading the list under this classification will be the voting on a constitution for the Association.

Other subjects to be discussed will probably be a code of ethics; the relationship between gas utilities and bottled gas distributors; the development of better sales methods; the elimination of unethical sales and advertising practices; also the matter of creating affiliated branches of the organization.

This first meeting is to be attended only by those eligible for a voting membership in the organization, namely those engaged in the merchandising division of the bottled gas industry. Manufacturers of appliances and equipment, who will probably come under the associate membership class, will not attend the first meeting, since the entire day's proceedings will be given over to organization matters. All future meetings will be attended by this group, however, since the Association recognizes the distinct advantage of having these manufacturers associated with them in their activities.

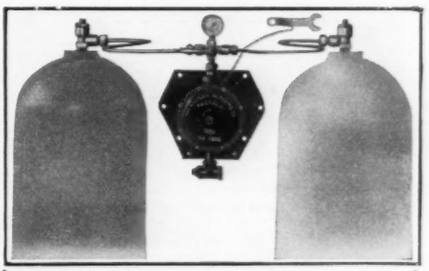
Between 50 and 75 are expected to attend the January meeting.

Eastern Shore Gas Co. Serving Propane at Snow Hill, Md.

The Eastern Shore Gas Co. is now serving gas in Snow Hill, Md., having completed a propane plant there. The company also owns franchises in Cape Charles, Chincoteague and Annancock, Va., where butane or propane service probably will be established. Headquarters for the company are at Pocomoke City, Md., where a butane plant is operated.

Lowville Gas Corp. to Set Up Financial Structure

Lowville Gas Corp., Lowville, N. Y., plans to begin construction of a butane gas plant at Lowville early in 1932, and has been given permission by the State Public Service Commission to set up a financial structure of Class A and B shares, both without par value.



The *Only* COMPLETE Propane Gas CONTROL

A complete manifold and regulating unit, work tested and factory assembled . . . the only *complete* liquefied petroleum gas control assembly you can buy; fortunately Rego-made . . consists of connections to cylinders, a 2-way throw-over valve (to shut off one side automatically when the other is opened), a regulator, mercury seal, supply of mercury, wrench . . . complete and ready to install.

In One Package

The REGO complete manifold and control unit is factory assembled and tested under actual working conditions . . . then packed in a substantial re-shipping carton.

Ready to Ship *for* Field Installation

Sell the job . . . ship the equipment, including the REGO carton . . . then send a man out to hook it up. That's what REGO means to the Liquefied Petroleum Industry!

Write **We have a wealth of data on marketing, and distribution; complete files on research and application. Ask us any question without obligation.**

The Bastian-Blessing Co.
254 East Ontario St.
Chicago, Ill.

DOMESTIC CUSTOMER

ADDRESS_____ DISTRICT_____ CLASS_____

NAME_____ OWNER ☐ TENANT ☐ NUMBER OF PEOPLE_____

_____ ROOMS HOUSE ☐ DUPLEX ☐ FLAT ☐ APARTMENT ☐ FIREPLACE—REAL ☐ FALSE ☐ NONE ☐

DATE:	RANGE	WATER HEATER	ROOM HEATER	FURNACE	REFRIG-ERATOR	INCIN-ERATOR	HOT PLATE	IRONER (MANGLE)	DRIER	WASHER	LIGHTS	MISCELLANEOUS
GAS APPLIANCE												
ELECTRIC APPLIANCE												
OIL APPLIANCE												
COAL, WOOD, ICE												
SIZE OR RATING												
MAKE												
CONDITION (YEARS, AGE, GOOD, FAIR, POOR)												

PRICE OF COMPETITIVE FUEL: ELECTRIC RATE_____ OIL $_____/GAL. COAL $_____/TON. WOOD $_____/CORD.

FUEL COST PER SEASON OIL / WOOD / COAL $_____ BASEMENT ☐ HOUSE PIPED FOR GAS. YES ☐ NO ☐

ATTITUDE TOWARD GAS_____

ADDITIONAL APPLIANCES NEEDED_____

ATTITUDE TOWARD PURCHASE OF NEW APPLIANCES_____

REMARKS_____

WATER HEATERS
I—INSTANTANEOUS
A—AUTOMATIC STG.
C—COMBINATION
T—TANK

ROOM HEATERS
RT—RADIANT
GR—GAS RADIATOR
C—CIRCULATING
W—WALL, BUILT IN
M—MISCELLANEOUS

FURNACES
FF—FLOOR FURNACE
A—HOT AIR UNIT
S—L. P. STEAM
W—HOT WATER
C—CONVERTED

OIL
D—DISTILLATE
K—KEROSENE
G—GASOLINE
F—FUEL
C—CRUDE

SOUTHERN CALIFORNIA GAS COMPANY 1-31 1481 1M

Survey form in use by Southern California Gas Co., Los Angeles, Calif.

What is Our Market Potential?

of advertising by direct mailing literature or instructions to salesmen as to how prospective purchasers should be approached. What other competing conditions are there such as municipal electric activity, dealers in competing fuels, etc.?

Each one of the six points in market analysis just discussed has a part in the picture, but they must be considered as a whole and not as individual units, for each one plays an important part.

During the latter part of 1929, natural gas was introduced in the territory of the Pacific Gas and Electric Co. and at the time of the change-over a survey was made of all consumers to determine what types of appliances were in use and what fuel was being used. This survey is not being held up as the acme of perfection, but is being used merely because the writer is more familiar with what has happened in this particular case. The survey findings are shown in Table No. 1.

In this area we were faced with the problem of quick recovery of revenue due to the change from a manufactured to natural gas. How could we get it? The heating field presented the greatest possibility for quick recovery of revenue for two reasons—low saturation of appliances and a higher unit revenue per sale.

The survey showed that 3,533 consumers were using wood, coal and oil in central heating plants and 2,249 competing fuels in individual room heaters, which gave us a pretty good basis to start on. In analyzing the cost of our service we found that our rates could successfully compete with coal at $12.50 per ton. In order to make the quick recovery that we desired, it was necessary that some gas burning appliance that would produce immediate results be offered to the consumer at a reasonable cost. For this reason, it was decided to put on an aggressive campaign selling conversion burners both for central furnace jobs and for individual room heaters.

(Continued from Page 29)

In view of the fact that we had 9,866 consumers with no central heating, it was decided that the regular salesmen would continue to concentrate their efforts on this, and that a special crew of men be employed for conversion burner sales only.

The next question which presented itself was how many men should be employed. Knowing the potential market and estimating the number of calls which could be made per man per day, it became a mathematical problem to determine the number of men required. In making the survey, we obtained the name and address of each customer, what type of equipment they were using, and what fuel. This gave us a complete mailing list for direct mail literature as well as information for the salesman as to exactly where his potential buyers were, and did away with the lost motion of salesmen canvassing to determine who was in the market.

The same method was used successfully in another field, namely, that of commercial heating. In this case we made an actual survey of commercial consumers using oil burners for heating and from that determined what our potential market was. A further study of this developed that a certain number of oil burners were sufficiently old to create maintenance expense for the consumer. This gave us a list of customers who presented immediate possibilities for closing.

A study of the competitive cost of oil vs. gas together with the factor of maintenance cost gave us some idea as to what success we could expect in converting these to gas. The question of the number of salesmen required to handle the job was worked out on the same mathematical basis as the previous survey.

A number of utilities are evincing greater interest in the problem of market analysis. These companies who have adopted such a program are enthusiastic as to the results obtained.

In laying out a program of market analysis it is suggested that it be started on rather a small scale and amplified as conditions warrant and in keeping with the results obtained.

The main fundamental to be adhered to is getting information that will be used—not just a lot of statistics. Market analysis is a guide, and not the final answer to successful sales administration.

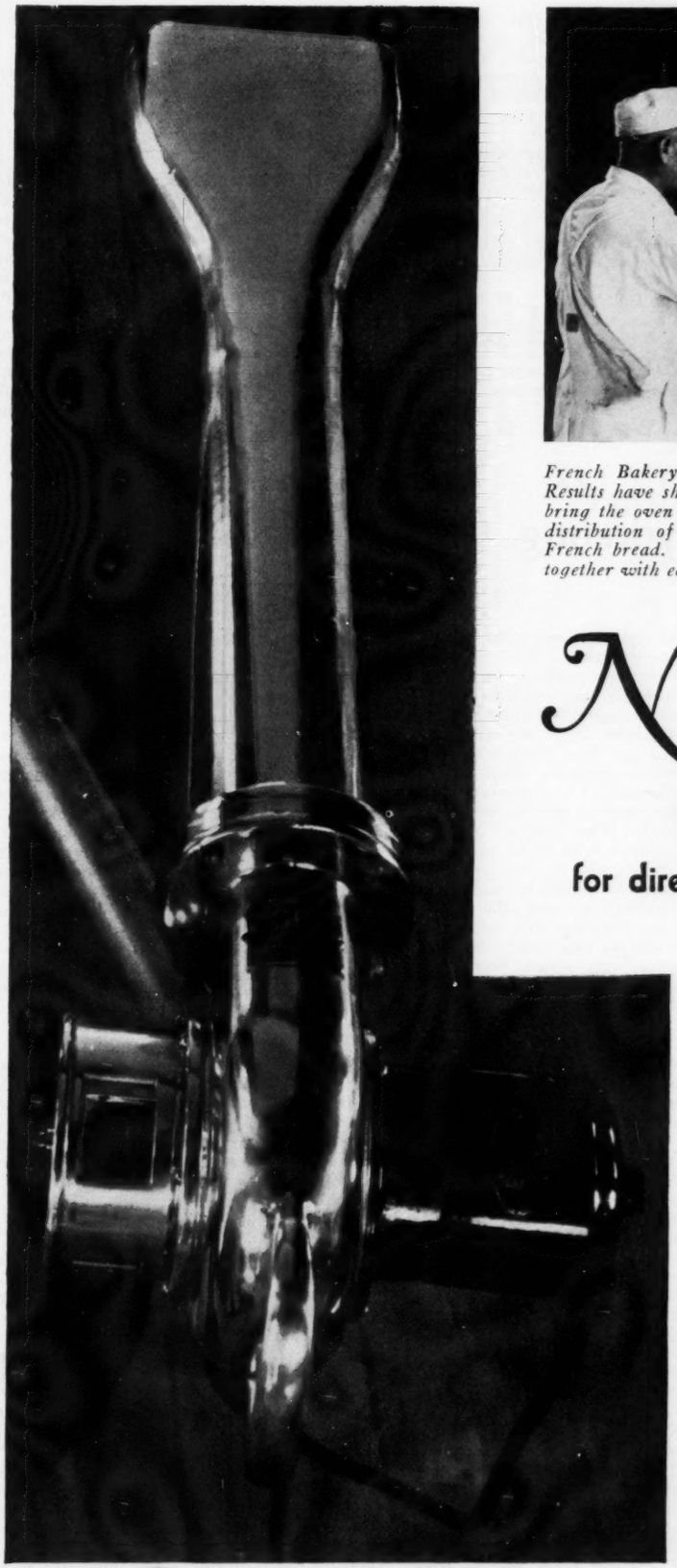
Several different methods are used in obtaining information, all fundamentally sound. The method used should, of course, fit the local condition of the individual utility involved.

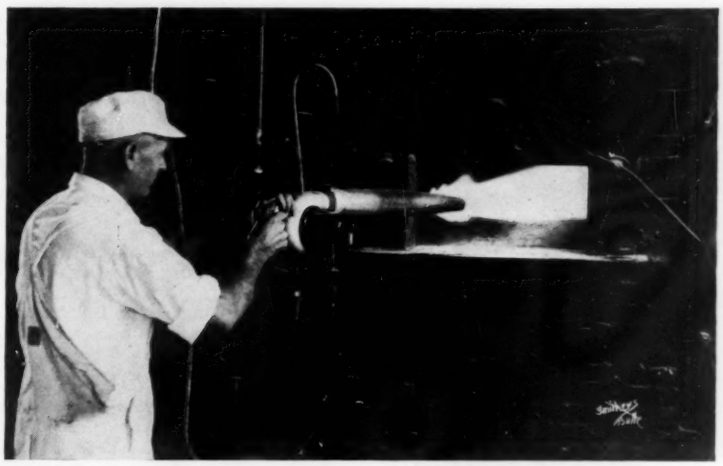
The science of market analysis is comparatively new in American business, but is growing and becoming increasingly important.

As a typical example of its importance, the General Motors Corporation, with an investment of $207,750,000, spends annually in excess of $75,000 for market analysis work.

The gas industry, with many times this investment, should give very serious consideration to a program of this kind when one takes into account the fact that we have a larger potentiality from the standpoint of number of prospective buyers; also, a much smaller unit investment on the part of the buyer of respective services.

While the gas industry is of a monopolistic nature, we are still in a very competitive





French Bakery, Butte, Montana, oven fired with the Type "G" Burner. Results have shown substantial savings in fuel costs and the time required to bring the oven to baking temperature has been materially reduced. Uniform distribution of heat with even heat penetration produces finest quality of French bread. Note flexibility of burner as to firing position. This feature together with ease of control in firing has distinct advantages for both heating up and flash heats.

N. G. E. Type "G" Gas Burners

for direct fired bake ovens of the "Dutch Oven" Type

Major advantages of this advanced type of burners are as follows: May be used for all kinds of baking, from hearth bread to pastry; baking can be done immediately after firing; uniform heat distribution eliminates waiting to "soak" heat; cast aluminum burner assembly eliminates excessive weight; facilitates handling; all parts standardized and interchangeable; burner furnished complete from dial gas valve to pilot lighter; maximum return on investment is insured by high efficiency, reasonable first cost, long life and freedom from upkeep expense.

Used and endorsed by leading bakeries and backed by the mature experience and thorough engineering and research that have made N. G. E. Gas Burners internationally famous. Operators of boiler plants and other gas fuel users are invited to utilize the services of N. G. E. engineers to select the type of burner best adapted to conditions in individual plants. Ask for new burner literature.

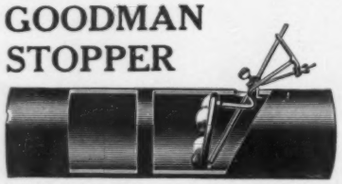
NATURAL GAS EQUIPMENT, INC.

LOS ANGELES, Petroleum Securities Bldg. SAN FRANCISCO, 1123 Harrison Street

Pacific Coast Distributors for Webster Engineering Co., Tulsa; Surface Combustion Co., Toledo

LOOK TO THE PIONEERS FOR CONTINUED LEADERSHIP

THE
GOODMAN
STOPPER

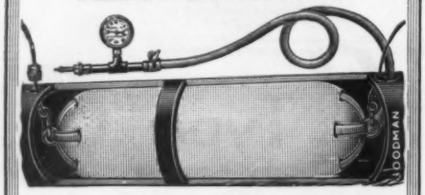


WHEN LOCKED IN PLACE IT HOLDS

DEPENDABLE GAS
MAIN BAGS

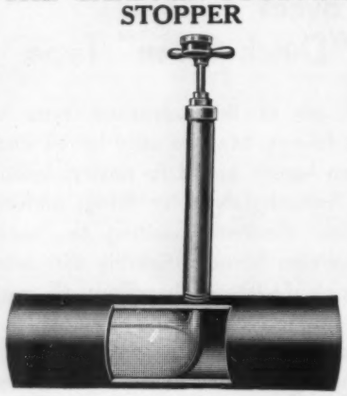
Type C

GOODMAN CYLINDRICAL
STOPPER FOR INTER-
MEDIATE PRESSURE



Increased Length for Increased
Pressure

THE GARDNER-GOODMAN
STOPPER



Patented

A new stopper for low and intermediate pressures.
For use on cast iron or steel, oversize or undersize mains.
Easily inserted in top, bottom or side of main, in open excavation or under pavements.
For pressure work, use two or more Stoppers in parallel.

SHIPMENTS FROM STOCK

SAFETY GAS MAIN
STOPPER COMPANY

523 Atlantic Avenue
BROOKLYN, N. Y.
Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street, San Francisco
California

business when you consider the other types of fuels that the consumer may use. If we are to make the progress that we should, we must aggressively and intelligently promote the gas business to meet this competition.

Saturation of appliances is of profound interest to the industry as a whole. The following figures give the percentage saturation in the cooking, water heating and heating classifications by geographic divisions of the Pacific Coast.

Pacific Northwest—(Washington, Oregon)—3 companies reporting 6,523 consumers surveyed:

Cooking	57.0%
Water heating	40.3%
Heating	6.3%

Northern and Central California—2 companies reporting 25,384 consumers surveyed:

Cooking	94.7%
Water heating	86.4%
Heating	16.6%

Southern California—2 companies reporting 7,980 consumers surveyed:

Cooking	98.1%
Water heating	88.6%
Heating	62.7%

While this information is very general in character, it is impossible to get a true representation of saturation by types of appliances for a geographic area unless all the member companies agree to standardize information and records. We ought to be in a position to know the saturation of different types of appliances under the general headings given above in order to determine the potential market. For example—how many ranges, cookers, hot-plates; and of competing fuels, what represents the competition. Is it wood, coal or what? We should know the same things about the other classes of business.

Dehydrating Commercial Propane

(Continued from Page 56)

is attached to the cylinder outlet by means of the ⅛-inch pipe fitting. The cylinder valve is opened and the propane vapor allowed to flow through the indicator. The pressure within the indicator will be the same as that of the cylinder, since the capillary orifice restricts the gas flow enough to prevent any appreciable pressure drop in the fittings or the indicator. The temperature of the indicator is the same as that of the cylinder (atmospheric). The vapor flowing through the indicator will be under the same conditions as the propane in the cylinder. After a short time the cobalt bromide will have reached equilibrium with the vapor flowing through it. Its color will then indicate the approximate per cent saturation with water of the vapor. As stated previously, this per cent saturation also bears a direct relationship to the per cent saturation of the liquid propane.

A study of the solubility of water in propane as effected by temperature (Table No. 2) shows that a sample of propane which seems dry enough when tested at 90° F. would be unsatisfactory when cooled to 32° F. An example will best illustrate this point. Let us suppose that an indicator turned blue on testing a sample of propane at 90° F., which would indicate that the propane was 30% or less saturated with water. Considering the maximum saturation indicated, this means that the propane contains .038 × .30 = .0114 per cent of water. Should this propane be used at 32° it will likely cause trouble, since at 32° propane can hold only .006 per cent of water. The propane under such conditions will not only be saturated, but will contain free water. It is, therefore, evident that tests run at higher temperatures will not certify the suitability of the propane for use at low temperatures.

Of course, a small sample of propane could be cooled to 32° F. and the test run with the indicator at 32° F., when the results would accurately indicate the dryness of the propane at that temperature. This is not possible with large containers. Also, it is not advisable to draw a small sample from a large container for test purposes, since it is almost impossible to get a representative sample. The small cylinder used to contain the sample will invariably adsorb an appreciable quantity of water on its walls, thereby partially dehydrating the sample. This could be avoided by very careful manipulation, emptying and filling the sample cylinder several times before drawing the final sample. However, the likelihood of obtaining a representative sample, even if such precautions are observed, is somewhat remote.

This difficulty is most easily overcome by cooling the indicator and passing the vapor from the original container through the indicator at a pressure just low enough to prevent condensation of the propane. Again a numerical illustration will show the efficacy of this method. Let us assume again that the propane at 90° F. turns the indicator blue, signifying 30 per cent or less saturation with water at 90° F. Upon cooling the indicator to 32° F. and reducing the pressure to 53.5 pounds gauge (slightly below the vapor pressure at 32° F.), the indicator is found to remain blue. It is apparent that the vapor under these conditions is less than 30 per cent saturated. Saturated propane vapor at 32° F. will contain 0.053 per cent of water. This vapor must, therefore, contain less than .30 × .053 = .0159 per cent of water. The vapor at 90° contains the same amount of water as at 32°, since none has been removed. Propane vapor saturated at 90° contains 0.174 per cent of water. Therefore, this vapor is not more than

$$\frac{.0159}{.174} \times 100 = 9.14 \text{ per cent}$$

saturated at 90° F. The liquid propane will then contain .038 × .0914 = .00347 per cent or less of water. Saturated liquid propane at 32° F. contains 0.006 per cent of water. If this particular sample of propane was cooled to 32° F. it would be not more than 60 per cent saturated and should give no trouble in use.

Table No. 4 has been prepared to show the efficacy of cooling the indicator to 32° F. while the remainder of the system stays at its original temperature during the test. This table gives the temperature of the liquid propane at the time of the test. The indicator is held at 32° F. and the pressure of the propane reduced to 53.5 pounds gauge before entering the indicator. The indicator is assumed to turn blue. The right hand column of the table shows the maximum possible saturation with water of the propane if the entire system should be cooled to 32° F.

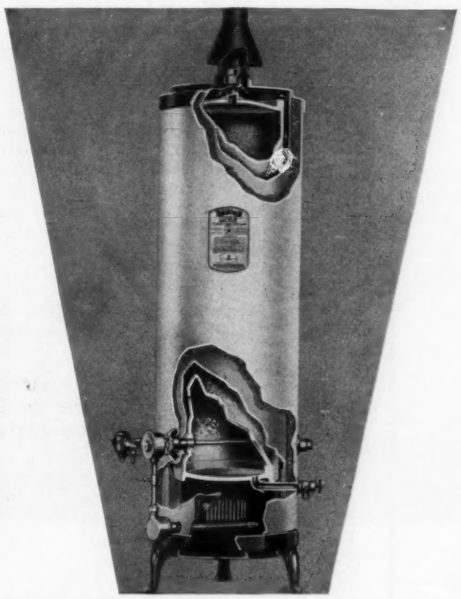
Ordinarily it should not be necessary to cool the indicator to 32°F. when making a test. Only in cases where there is a possi-

Announcement

The First of a Series of New Developments

By Welsbach Laboratories

The Welsbach Automatic Burner



on

Welsbach Self-Action Storage Gas Water Heaters

for

Natural or Manufactured Gas

This burner combines permanent efficiency
with
Complete Safety Shutoff
of gas to both main burner and pilots
The Safety Shutoff feature operates quickly

The Welsbach Automatic Burner
is NOT a Bunsen Burner

Announcements of Additional Developments
By
Welsbach Laboratories
will be made soon

Write or Wire

50 Hawthorne Street
San Francisco

Welsbach
COMPANY
Gloucester City, N. J.

For details or demonstration

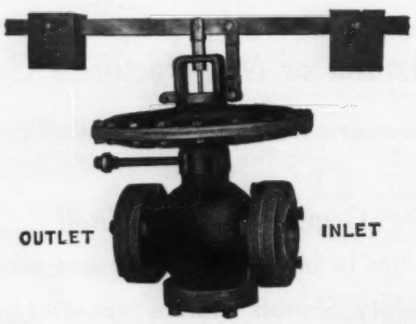
226 So. Wabash Ave.
Chicago

For District or Individual Service—

The CF Weighted Illuminating Regulator

It is designed to reduce a medium pressure of 15 pounds or less to any given delivery pressure between one ounce and five pounds.

This is but one of the valves described in our catalog. Sent on request.



The Chaplin-Fulton Mfg. Co.

Organized 1884—Oldest Builders of Gas Regulators in the Country. Built in all Sizes from 1 inch to 24 inches; For all Service, 1 oz. up to 2,000 lbs. Pressure to Square Inch.

28-40 Penn Avenue **Pittsburgh, Pa.**

REPRESENTATIVES

WESTCOTT & GREIS, Inc.
Sales and Service
Dallas — Los Angeles — Tulsa

JNO. W. CRAWFORD
Sales Engineer
1855 Industrial Street Los Angeles

PARSONS ENGINEERING CO.
Los Angeles, Calif. San Francisco, Calif.

Or Any Jobber

FORNEY

COMBINATION GAS and OIL BURNERS

For Power Plant and Industrial Uses

Write for Literature
and List of Installations

FORNEY COMBUSTION ENGINEERING CO.
513 CENTRAL BANK BUILDING, DALLAS, TEXAS

Table No. 4. Observations on Sample of Propane Saturated to Such an Extent That the Indicator Turns Blue at 32° F. and 53.5 Pounds Pressure

Temperature of Liquid Propane at the Time of Test, ° F.	Approximate Maximum Per Cent Saturation of Issuing Vapors with Water When System is Cooled to 32° F.
90	58
80	53
70	48
60	43
50	37
40	32

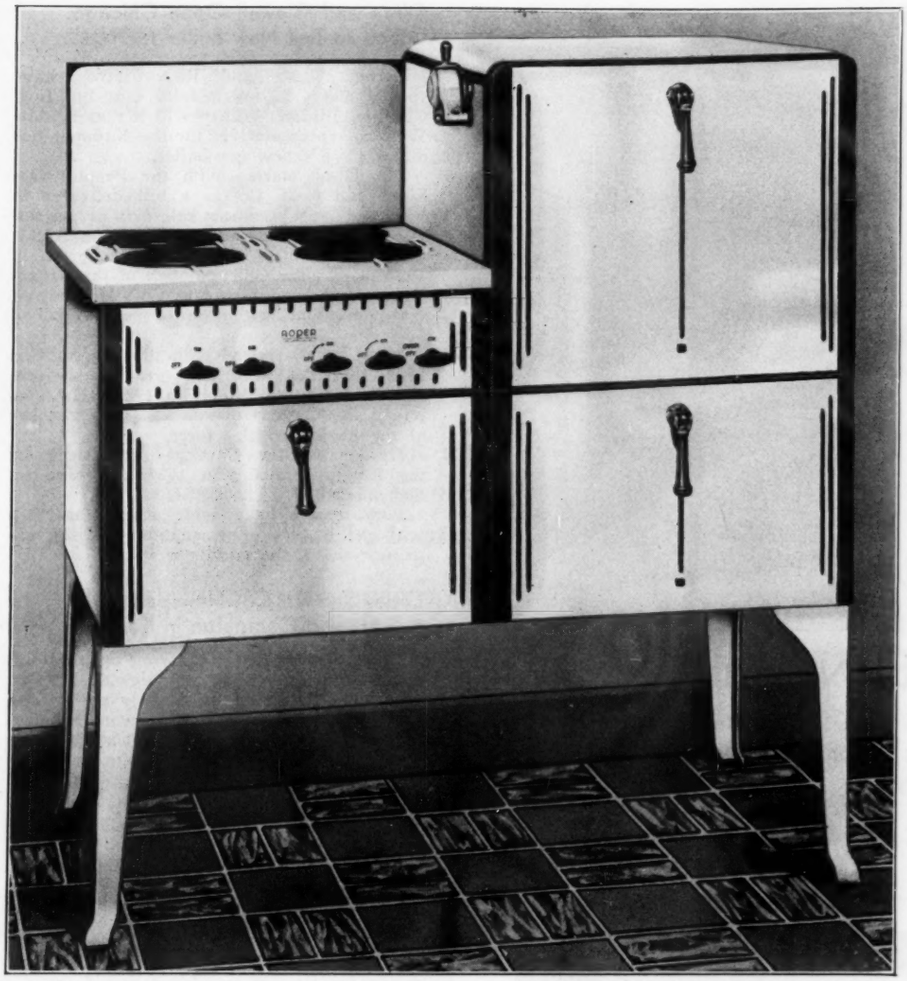
bility that the propane tested at high temperature will be used at low temperature will this more vigorous test be required. As long as the propane is used at temperatures of not more than 30°F. below the temperature at which tests are made, no trouble will be experienced with water in propane which turns the indicator blue. It is also obvious that in the normal course of utilization from a cylinder, propane automatically dehydrates itself; that is, the water if present is almost entirely removed during the early stage of the utilization. Table No. 5 shows the maximum saturation with water of various propane vapors when cooled to 32°F., the vapors in each case being saturated to the extent necessary to result in the indicator turning blue at the tabulated higher temperature.

Table No. 5. Observations on Samples of Propane Saturated to Such an Extent That the Indicator Turns Blue at the Test Temperatures Noted

Test Temp. °F.	Approximate Maximum Per Cent Saturation of the Liquid Propane with Water when cooled to 32° F.	
90	190	Free water present
80	150	Free water present
70	110	Free water present
60	80	
50	55	
40	40	
32	30	

According to Table No. 5 propane tested at 60°F. or below should be satisfactory for cold weather use. For instance, propane vapor 80 per cent saturated with water, must have approximately 20 per cent condensed before ice will be deposited; that is, before the uncondensed vapor becomes saturated with water; thus, 80 per cent saturation gives a considerable safety factor.

The use of the cobalt bromide indicator is not restricted to propane vapor. It may be applied to any hydrocarbon and the results may be interpreted in the same manner. It can be used to indicate the humidity of any gas or vapor that does not have a deleterious effect on the cobalt bromide. Some of the substances that will ruin the indicator are strong acid vapors, ammonia, pyridine and other amines, alcohol vapors, and probably most of the more active sulphur compounds. As shown above, the indicator can be made to more accurately determine the humidity of the vapor by changing temperature or pressure until the color just changes, when the humidity under the new conditions will be known. Simple calculations will then give the humidity of the gas under its original conditions.



Open Top or Closed ?

Sani-Speed has all of the advantages of both

Instant Heat—Concentrated Heat—High Efficiency

Opinions may vary regarding the merits of open or closed top ranges. Each has its adherents and each has its advantages. It remained for the new Roper "Sani-Speed" to combine in one style top all of the advantages of both open and closed models.

The cooking top is enclosed with an enameled cast iron plate for cleanliness and beauty. The heat from the burners is delivered directly and concentrated on the cooking utensils above. The lids are perforated for speedy operation and beveled at the sides for visibility of the flame. Raised ribs on the cooking top permit easy sliding of cooking utensils. The manifold is so designed that the valve handles remain cool.

Each range is regularly furnished with the "Instaflame" lighter, or with the "Touch-a-button" Type, as desired. The new Roper "Sani-Speed" top represents a major improvement in gas ranges, the most outstanding and entirely new development in years, and its beauty is unsurpassed in all gas range construction.

ROPER

TRADE MARK

C. B. BABCOCK CO.

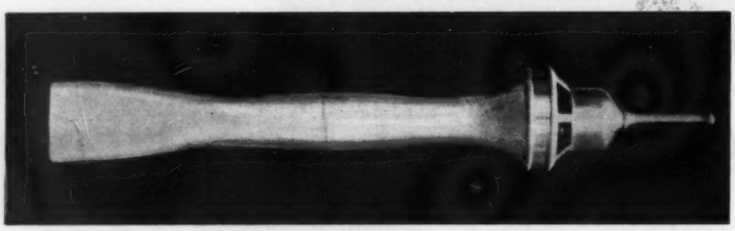
Pac. Coast Branch
135 Bluxome St.,
San Francisco

FOR SOUTHERN FUEL CO.

76 Miles of this 26" Steel Pipe Line (Kettleman Hills-Long Beach Line) was supplied by

WESTERN PIPE & STEEL CO.

of California



NEMEC BLOWER TYPE BAKERY BURNER

NEMEC combustion ENGINEERS

WHITTIER – CALIFORNIA.

GROBLE REGULATORS & GOVERNORS

Complete Line of Regulators for

Natural, Manufactured, Butane and Propane Gas

Pacific Coast Representative,

T. G. ARROWSMITH COMPANY,

661 Howard Street San Francisco, Calif.

Phone Garfield 8419

GROBLE GAS REGULATOR COMPANY

Office and Factory: Anderson, Indiana

Olson and Clewell Open Chicago Office to Sell New Boiler for Nat'l.

Barney Olson and Ray Clewell have opened offices in the Peoples Gas Building, Chicago, Illinois. They will act as Middle Western representatives for the National Radiator Corp.'s new gas boiler.

Mr. Olson started with the Peoples Gas Light and Coke Co. as a bill deliverer in 1902 and later became a salesman of gas appliances. In 1915, he organized the Architects' and Builders' Service, which he left in 1922 to join the Chicago office of the Bryant Heater and Manufacturing Co. He severed his connection with that organization on September 15.

Mr. Clewell started with the Peoples Gas Light and Coke Co. after graduating from the University of Illinois in 1923. He later joined the C. A. Dunham Co. as a member of the St. Louis sales force.

He entered the Chicago organization of the Bryant company in 1927, resigning on September 15.

Both men have a wide acquaintanceship with the heating contractors and utility organizations of the middle west.

Cities Service Co. Newspaper Advertising Campaign in Kansas

Cities Service Co. is carrying on a special newspaper advertising campaign in Kansas, with copy appearing in 18 daily papers and 64 weeklies. The advertisements are designed to tell the story of the company to its customers and the general public, featuring gas rates, gas service, etc., pointing out the fact that the company is spending large sums annually in the state in payrolls, purchase of materials and supplies, gas and oil, and in the payment of lease rentals.

96 Cities and Towns Now on Northern Natural System

Northern Gas and Pipe Line Co., Omaha, Neb., subsidiary of Northern Natural Gas Co., reports that it is serving 301,634 consumers, in 96 cities and towns in the Middle West, with natural gas. One thousand seven hundred and ninety-six miles of pipe line carry the gas to population centers. Of this mileage in operation, 978 miles are main lines and 18 miles are branch lines. This figure is of December 1.

L. H. Brendel Goes to Boston for Mason Regulator Company

L. H. Brendel, for the past four years advertising manager for Neilan Co., Ltd., at Los Angeles, has been appointed advertising manager for the Mason Regulator Co. with headquarters in Boston, Mass., effective January 1.

Line to Serve Green Fire Brick Co. Completed in December

Missouri Power & Light Co., Kansas City, Mo., is nearly ready to begin gas service to the A. P. Green Fire Brick Co., near Mexico, Mo. A 6-inch line was constructed from the Panhandle Eastern Pipe Line Co.'s major line from Texas fields.

Missouri Power & Light Granted Franchise in Vandalia, Mo.

The Missouri Power & Light Co., Kansas City, Mo., has been granted a franchise for the service of natural gas in Vandalia, Mo. The company is now constructing a distribution system, with service scheduled to begin shortly.

How ROBERTSHAW
Adds New Interest to Your Appliance Department

WHEN WOMEN THINK about cooking these days, they think about a gas range with a Robertshaw controlled oven.

When they come to your appliance department, they expect to see the Robertshaw on most of the ranges you exhibit.

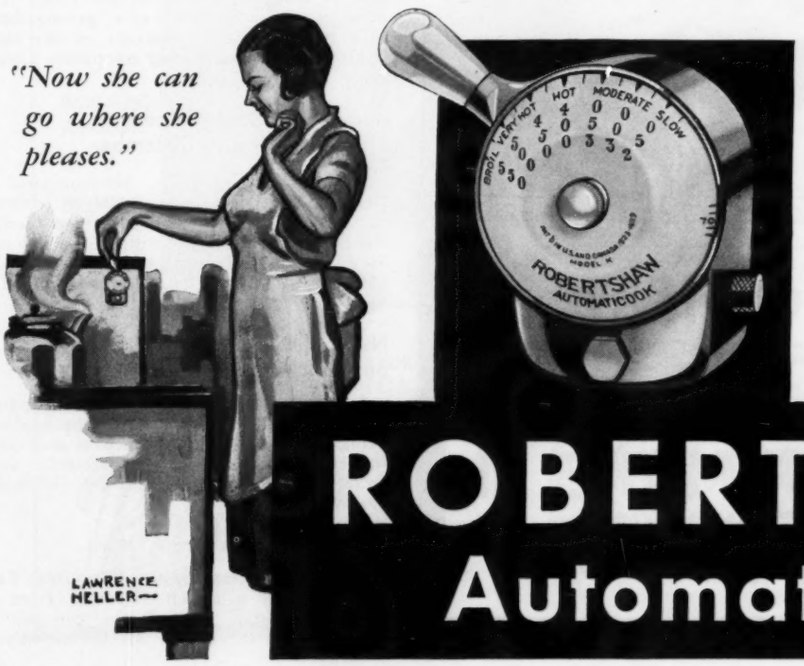
Robertshaw advertising in the national magazines, kept up year after year, has been a most powerful force in showing women that their present range is inadequate . . . that they are genuinely entitled to a *new* range, a *gas* range, and a range with the Robertshaw AutomatiCook oven control.

And remember, too, when you display Robertshaw equipped ranges you win the instant confidence of your customers.

Robertshaw leadership is convincingly demonstrated by the fact that the great majority of gas range makers use the Robertshaw as standard equipment.

Whenever a woman sees a Robertshaw on a range, she knows it means the last word in range service. She knows it assures correct oven performance . . that every dish she puts in the oven will come out exactly right.

The Robertshaw advertising and merchandising campaign this year is especially designed to help your appliance department. Let us tell you all about it.



The
ROBERTSHAW
Thermostat Company
YOUNGWOOD · PENNSYLVANIA

ROBERTSHAW
AutomatiCook

X th OLYMPIC GAMES 1932 LOS ANGELES

READERS of WESTERN GAS

MAKE USE OF OUR OFFICES as headquarters during your visit to the Olympic Games.

YOUR MAIL may be forwarded in our care.

USE OUR FREE stenographic and telephone service.

HOTEL RESERVATIONS and sight seeing trips planned for you.

MEET YOUR friends here.

124 West 4th Street
Los Angeles

Stop at San Francisco on your trip to or from the Olympic Games. The same facilities are offered you at the San Francisco office of WESTERN GAS—447 Sutter Street—San Francisco

WE'LL BE GLAD TO SEE YOU.

WORTHINGTON PRODUCTS

COMPRESSORS
Portable . . . Stationary

ROCK DRILLING EQUIPMENT
Rock Hammers and Drifters
Contractors Air Tools
Drill Steel and Accessories
Automatic Heat Treating Machines
Forging Furnaces

MULTI-V-DRIVES

PUMPS
Centrifugal . . . Steam . . . Power
Rotary . . . Deep Well

FEEDWATER HEATERS
Locomotive . . . Stationary

CONDENSERS
and Auxiliaries

METERS
Water . . . Grease
Oil . . . Gasoline

DIESEL ENGINES

GAS ENGINES
Power and
Compressor Units

CHROMIUM PLATING

Literature on request

WORTHINGTON PUMP AND MACHINERY CORPORATION
Works: Buffalo, N. Y.; Cincinnati, Ohio; Harrison, N. J.; Holyoke, Mass.
GENERAL OFFICES: HARRISON, N. J.
District Sales Offices or Representatives in Principal Cities

WORTHINGTON

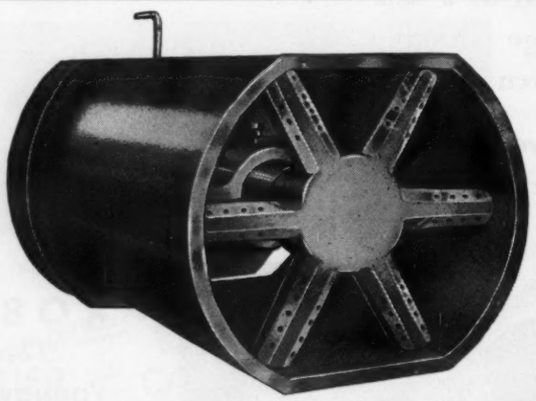
G-85A

GAS BURNERS
For
ALL INDUSTRIAL PURPOSES

JOHN ZINK CO.
Oklahoma Natural Gas Bldg.
Phone 4-9838
TULSA, OKLAHOMA

★

Flameless Burners
Flame Burners
Short Flame Burners



REFRACTORIES
For Gas Appliances

Genceraco Refractories are made in all shapes and sizes, in color, decorated or plain and in any quantity. They may be had in dense as well as porous material. These refractories are extremely resistant to thermal shock and are physically strong. We will gladly send you a quotation on your requirements for space heater radiants, leaning baffles, back walls, tunnel radiants, radiant sticks, burner tips, or any special pieces.

GENERAL CERAMICS COMPANY
71 West 35th Street, New York, N. Y.

Wilson-Maeulen Co. Pyrometer Division Merges With Foxboro

The Pyrometer Division of the Wilson-Maeulen Co., Inc., has merged with The Foxboro Co. This action has followed 25 years of cooperation between the two companies. The entire personnel of the Pyrometer Division of Wilson-Maeulen Co. will be merged with that of The Foxboro Co.

The Wilson-Maeulen Co. specializes in the manufacture of electric indicating, recording and controlling pyrometers and electric resistance thermometers for temperatures up to 3600° F.

The Rockwell hardness tester which has been manufactured by the Wilson-Maeulen Co. will hereafter be built and sold by the Wilson Mechanical Instrument Co. which succeeds the Mechanical Instrument Division of Wilson-Maeulen Co., Inc., and continues in the same factory and offices at 383 Concord Ave., New York City.

The Wilson-Maeulen pyrometers and controllers will be built in the factories at Foxboro. All communications relative to the company's pyrometers should be addressed to Wilson-Maeulen Pyrometer Division, The Foxboro Co., Foxboro, Mass.

Central States Power & Light Improving Pampa System

Construction was recently completed on improvements to the Pampa, Texas, gas system of the Central States Power & Light Corp., with a total expenditure of $30,000. The improvements consist of a 6-inch low pressure belt line through the main residential section and a 4-inch transmission line to wells five miles west of Pampa, this being the fifth transmission line supplying the city.

According to J. W. Garman, Jr., district manager, plans are being drawn for an additional expenditure of $20,000 for an 8-inch loop around the business district.

Managers and Salesmen of Wyo. Companies Hold Monthly Meetings

Managers and salesmen of the North Central Gas Co. and the New York Oil Co., headquartered at Casper, Wyo., are holding monthly meetings at various towns on the company's lines, the December meeting being held at Douglas, Wyo., on the 19th. The meetings are in the nature of a "get-together," with from 25 to 30 members of the staffs of the various distributing companies attending.

Union Gas Corp. Placed in Receivership in December

The Union Gas Corp., headquartered in Independence, Kan., was placed in receivership in December through a petition filed by the American States Securities Corp. Donald Stewart of Independence, and Edmund Mitchell of Wilmington, Del., are named as receivers.

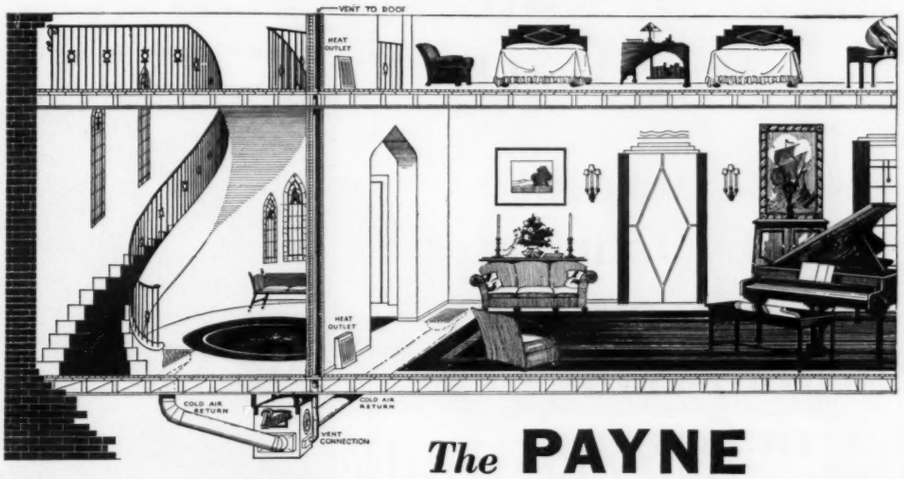
Newton, Kan., To Vote Jan. 12 on Franchise Application

January 12 is the date set for a gas franchise election in Newton, Kan., the applicant being Newton Gas Co., which is now serving the town. The city recently voted against a municipally owned gas distribution system.

Line to Ft. Mackenzie, Wyo.

Northwest States Utilities Co., Great Falls, is completing a 6-inch extension from the Buffalo-Sheridan line of the company in Wyoming, to serve Fort Mackenzie, Wyo.

And Now UNIT HEATING *without a Basement—for*

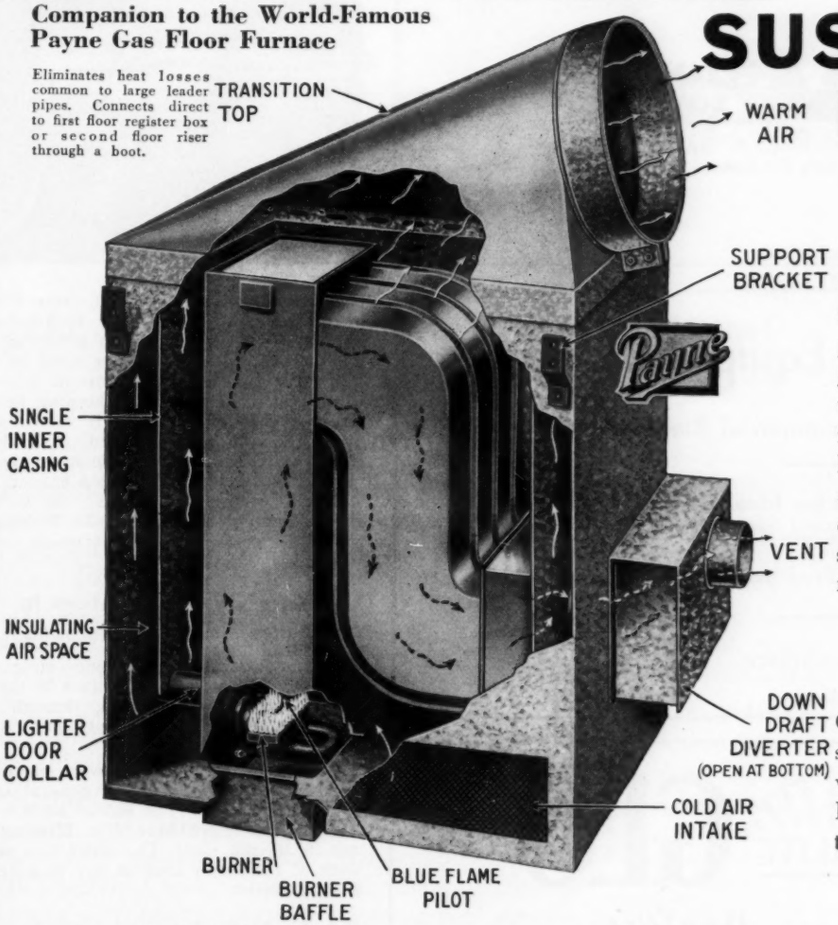


SECOND FLOORS
in
Single and
Double
Residences
Flats
Apartments
and
Transient
Hotels

The PAYNE SUSPENDED FURNACE

Companion to the World-Famous Payne Gas Floor Furnace

Eliminates heat losses common to large leader pipes. Connects direct to first floor register box or second floor riser through a boot.



Used With or Without Cold Air Return

Eliminates expense of excavating for basement and long leader pipes to rooms. Hangs from floor joists under the house. Ideal for two-story duplexes and unit heating plan in multiple dwellings. Provides an ever-changing room atmosphere, heated to the exact degree desired and controlled instantly by electric switch or thermostat.

Send for New Bulletin No. 11

Gives complete description of construction and equipment. Also a variety of typical plans where Payne Suspended Furnaces solve the heating problem.

Payne

PAYNE FURNACE & SUPPLY CO.
BEVERLY HILLS, CALIFORNIA
There is a Payne Heat System for Every Building and Climate

First in the Field with a Brand-New Product!

Watch for the complete announcement by Johnson Gas Appliance Company in the February issue of Western Gas.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Pacific Coast Representative—C. B. BABCOCK CO.
135 Bluxome St., San Francisco, Calif.

Newman Gas Equipment Co.

Industrial and Commercial Burners

Upshot Burners for Ideal Boilers

Bailey Regulators for Gas Fuel and Pressure Regulation

447 Sutter Street San Francisco Ph. GA 7833

RAY VITALITE GLO

Radiant Gas Heaters

Send me details about the quick, easy installation feature, and "fixed mix."

Name .....

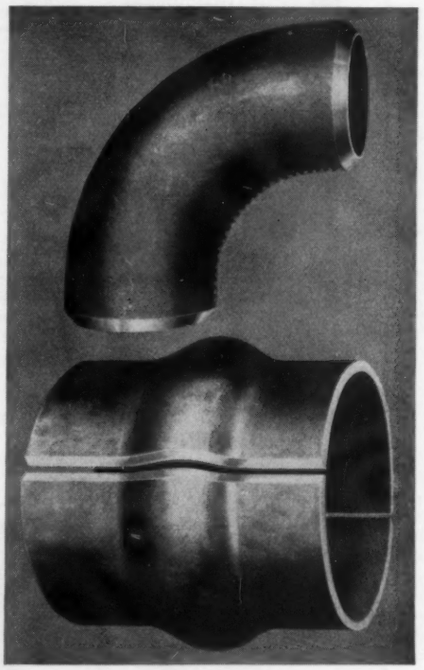
Company .....

Address .....

Clip and Mail to Ray-Glo Corporation, Athens, Ohio.

Midwest Piping & Supply Co. Bulletin Describes Welding Fittings

MIDWEST Piping & Supply Co., Inc., St. Louis, Mo., recently issued a brochure featuring the line of Midwest welding fittings, including ells, head, saddle and sleeve. Table of sizes for each fitting are given, together with the prices and other



data. The welding sleeve illustrated in the lower figure above is used to reinforce a butt line weld between two pieces of pipe. This sleeve relieves the butt weld of bending stress and the purpose of the butt weld becomes principally that of keeping the joint tight. A 90° welding ell is shown in the upper illustration. The welding saddle, not illustrated, is for application at the junction of neck and body of a welded header. The saddle is designed to relieve the weld between neck and body of tensile, bending and shearing stresses to which it would be subjected.

Lone Star Offers Suggestions to Consumers Through Advertising

Suggestions for saving money on gas bills are being explained to customers of the Lone Star Gas System in Texas, through newspaper advertisements called the "Thrifty Housewife" series.

The economy suggestions were started with a 50-inch advertisement on general savings in the use of gas. The second ad was titled "5 Ways to Save Money in Heating" and ran in 30-inch size. The series will take up each of the major uses of gas in a separate advertisement.

Peoples Natural Applying at Jackson

The franchise election scheduled to be held at Jackson, Minn., on November 24, was postponed to December 22. Applicant is Peoples Natural Gas Co., subsidiary to Northern Natural Gas Co., Omaha, Neb.

Worthing, S. D., to Have "Natural"

On December 15 the town of Worthing, S. D., granted a natural gas franchise to the Sioux Falls Gas Co., Sioux Falls, S. D.

The Minneapolis-Honeywell

Electric Clock Thermostat

Its self-starting electric clock puts a stop to clock service calls

Here is fuel-saving clock thermostat control of room temperature in its most modern form—all electric. The spring driven, hand wound clock is replaced by the self-starting *electric* clock on the new Minneapolis-Honeywell Electric Clock Thermostat.

No winding. No forgetting. No more service calls to wind clocks.

Plain thermostats or clock thermostats of earlier patterns are easily replaced by this modern all electric thermostat. Gas companies! Here is a new opportunity for extra profit!

Silent, completely silent, automatic change of temperature setting every night and morning is now made possible by the Minneapolis-Honeywell Electric Clock Thermostat. Manufacturers! Here is your opportunity to offer the fuel savings of lower night temperatures by a means that eliminates the last objection to clock control.

Regulated frequency, 60-cycle alternating current, now supplied in most cities, runs this clock's motor which is remarkable for its low R. P. M.

Get full details about this wonderful step forward in thermostatic control for house-heating. Ask the nearest Minneapolis-Honeywell Branch Office or Distributor.

Minneapolis-Honeywell Regulator Co., *California Branch:* 557 Market St., San Francisco, California. *Distributors:* Portland, Seattle, Los Angeles, Salt Lake City, Denver.

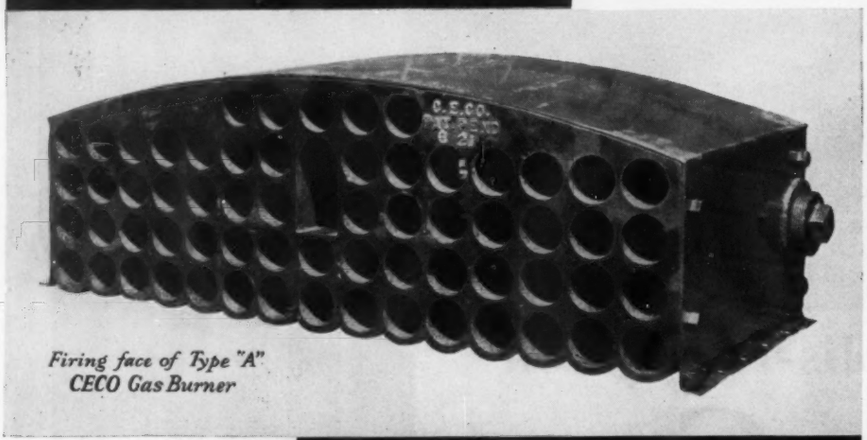
DISTRIBUTORS: *North Coast:* Arthur F. Erickson Co., 315 Selling Bldg., Portland, Ore., 816 Terminal Sales Bldg., Seattle, Wash. *Southern California:* English & Lauer, 1224 South Pedro St., Los Angeles, Calif. *Denver:* Daly Co., 1635 Blake St., Denver, Colo., *Salt Lake City:* Hawley-Richardson-Williams Co., 204 Dooly Bldg., Salt Lake City, Utah.

The Minneapolis-Honeywell Electric

Silent, dependable thermostatic control with self-starting electric clock

MORE HEAT FOR LESS MONEY

A BULLETIN FULL OF MONEY-SAVING FACTS IS YOURS FOR THE ASKING



Firing face of Type "A" CECO Gas Burner

COMBUSTION EQUIPMENT COMPANY
KANSAS CITY, MO.
WICHITA MEMPHIS HOUSTON

CECO
POWER PLANT TYPE
(A & E SERIES)
MULTIPLE JET GAS BURNERS

BITGOOD
Multiple Jet Gas Burners
Industrial Furnaces
SAN JOAQUIN BURNERS
Prat Daniel Thermix Stacks and Air Heaters
Bigelow-Liptak Suspended Arches and Walls
North American Burners and Blowers
F. S. BITGOOD, Inc.
Furnace and Combustion Engineers
Los Angeles Portland San Francisco

Gentlemen:
Kindly send me a sample can and full details regarding A-B Vit
The New Porcelain Enamel Cleaner
Name.....
Company.....
Address.....
No obligation, of course
Clip and Mail with 10c to cover postage and packing to
A-B STOVE CO., Battle Creek, Mich.

Gas Control System Without Moving Parts on the Market

A GAS control system constructed without moving parts has recently been placed on the market by O. A. Knopp, research engineer of the Pacific Gas and Electric Co., and is being placed on the market by the Gas & Electric Facilities, Ltd., San Francisco, officers of which are Frank Cressy, president; A. H. Markwart, vice-president; O. A. Knopp, vice-president; Stanley A. Weigel, secretary-treasurer; B. W. Mueller, manager.

The fundamental principle of the safety pilot is based on the electric conductivity of glass when heated and its insulating properties when cold. In operation, the small pilot flame impinges on the metal tube encasing a glass bar with a copper core. The tube

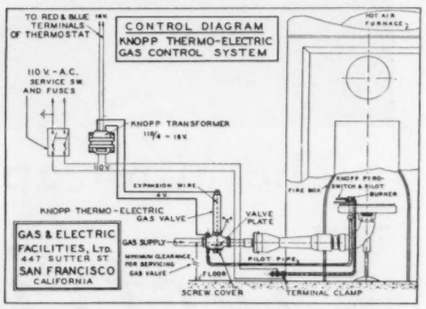


Diagram of the new control system which consists of a floating control, transformer, gas valve, Pyro switch and pilot light.

itself and the metal core represent the two poles to which electric current may flow. When the glass is heated the normal electrical resistance of glass is reduced to the point where the current flows from the metal core to the metal tube or outer shell. The circuit thus closed creates heat in a special resistance wire which expands in the valve proper, allowing the valve to open and the gas to pass through.

The glass "Pyro switch" as the safety pilot is called is self-healing. Even the complete shattering of the glass inside has been found to make no difference in the operation of the unit, as immediately upon application of the heat of the pilot flame the fragments in the tube heal together, forming a solid body, returning to its former stage.

The complete control system as now placed on the market consists of a floating control or room thermostat, transformer, gas valve, Pyro switch and pilot light.

Dallas Gas Building Dedicated With Radio Jubilee, Nov. 25

The Dallas Gas Building was one of five skyscrapers formally dedicated November 25 with a radio jubilee from Station WFAA in Dallas, sponsored by the Chamber of Commerce.

Brief talks were made during the program outlining the history of the use of gas in Dallas, and the need for the present building. R. G. Soper, vice-president of the Dallas Gas Co., represented the company.

During the dedication program, the building was kept open to visitors, employees serving as hosts and hostesses.

American Gas Co. Asks Osage Permit

American Gas Co., Galena, Kan., is applying for a franchise for the service of natural gas in Osage City, Kan. The election was scheduled to be held December 29.

These Pacific Radiant Heaters Never Need Adjustment!

No. 610 Eureka—10 flames; height, 24½"; width, 38"; depth, 13". Finished in Ebony Bronze, Old Iron, Oxidized Brass, Statuary Bronze, Natural Bronze or Antique Brushed Brass.

No. 810 Aztec—10 flames; height, 24"; width, 33"; depth, 11½". Finished in Antique Brushed Brass, Oxidized Brass or Statuary Bronze.

Many Handsome Models

The illustrations above show two of the many models of Pacific Radiant Heaters. There is a style and finish to suit every purse and every taste.

A. G. A. Approval

Every Pacific New Feature Radiant Heater carries the famous Blue Star, signifying the approval of the American Gas Association from the standpoints of basic national safety requirements.

Trouble-Proof Pacific Burners Please Customers and Profit You

WHY SELL a radiant gas heater that must be adjusted (perhaps inaccurately) by the man who installs it? Any time later, for various reasons, it may get out of adjustment and cause a smoky, smelly flame.

The Pacific New Feature Burner has **no adjustable air mixers.** It is scientifically constructed **at the factory** to inject the correct amount of air. It never gets out of adjustment, always burns with an intense blue flame, is odorless, noiseless, and safe.

Pacific radiant fireplace heaters completely satisfy your customers, save you costly servicing, and carry the **good profit** of a quality line.

Note These Features

1. No adjustments to make on burners.
2. Burners instantly removable for cleaning—just lift out.
3. Operates perfectly on varying gas pressures.
4. So simple, efficient, and accurately constructed that service adjustments are practically eliminated.
5. Installation is cheaper and easier because it requires only a gas connection and no burner adjustment.

Write for Valuable Agency Proposal

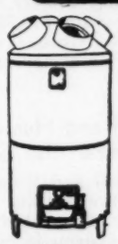
We make an interesting and worth-while offer to any well established firm that is interested in selling more and better gas-heating appliances. Write today for full details of attractive dealer proposition.

Pacific Gas Radiator Company

Gas Heating Headquarters

Roseberry and Walter Streets
Huntington Park California

Gas-Steam Radiators



Round Furnaces

Dual Pipeless Furnaces

Fireplace Radiant Heaters

Recess Radiant Wall Heaters

Automatic Storage Hot Water Heaters

Pipeless Floor Furnaces

Gas Radiators—Pressed Metal and Cast Iron

Agencies Throughout the West

Call for a Pacific Heating Engineer

MANUFACTURERS *of* EVERY TYPE *of* GAS HEATING APPLIANCE

Electrogas Floor Furnaces—5 A.G.A. approved models—to meet all requirements

Electrogas
FLOOR FURNACE
"It's Matchless"

NOW—more than ever before, Quick, Economical Heat is in demand wherever Natural Gas is available. 1932 will be profitable for those who are ready to meet this demand.

[Write us—right now—for details of our new cooperative selling plan.]

Electrogas Furnace Co., 466 Sutter St., San Francisco

Proven economy and efficiency through ten years of service.

Announcing
The New
No. 110
Fraser Floor Furnace
20,000 B.t.u. INPUT
LIST PRICE $45.00

Approved by
A. G. A. Testing Laboratory

Write for Specifications and Further Information

Manufactured by
Fraser Furnace Company
Stockton, Calif.

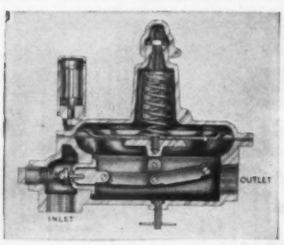
Distributed by
H. R. BASFORD CO. San Francisco Los Angeles

SOUTH CHESTER STEEL PIPE

Excels for Gas Service

The unusual care given to accuracy of diameter and welding qualities, makes Chester Pipe a favorite for gas lines.

SOUTH CHESTER TUBE CO.
Chester, Pa.



REYNOLDS
GAS CONTROL SINCE 1892

Reynolds Products—

Products for all kinds of Pressure Reduction—for either artifiicial or natural gas.

GOVERNORS—Intermediate Pressure, Triple Outlet, Holder, Toggle Type Street.

REGULATORS—High Pressure Service, Low Pressure Service, High Pressure Line, Single and Double District Station.

VALVE—Automatic, Quick-Closing Anti-Vacuum, Relief, Cut-off.

Reynolds Gas Regulator Co.
Anderson, Indiana
422 Dwight Building—Kansas City, Missouri
Second Unit Santa Fe Building—Dallas, Texas

Pacific Meter Wks. Takes Over Sales and Service of Westcott Devices

ANNOUNCEMENT has been made that, effective January 1, 1932, the Pacific Meter Works will assume sales and service on the Pacific Coast of Westcott orifice meters and gauges and other control devices manufactured by the Metric Metal Works and previously handled by Westcott & Greis, Inc.

A complete stock of meters, gauges, control devices and parts will be carried in the Pacific Meter Works factories at 2118 Atlantic Street, Los Angeles, and 495 Eleventh Street, San Francisco.

The company will warehouse and service the products manufactured by Crosby Steam Gauge and Valve Co., Taylor Instrument Co.'s and The Meriam Co., and will also continue the agency for the Robinson Orifice Fitting Co. of Los Angeles as previously done by Westcott & Greis, Inc.

Sales and service in Southern California will be under the personal supervision of Kenneth C. Tomlinson, assistant manager of Pacific Meter Works at 2118 Atlantic Street, Los Angeles.

Women's Committee Organized by Lone Star Gas Company

A woman's committee to sponsor educational programs for women employees of the Lone Star Gas system was recently organized in Dallas with Miss Mary Emison, temporary chairman. Representatives from each of the companies with headquarters in the Dallas office are as follows: Community Natural Gas Co., Mrs. Ethel Tribble; Municipal Gas Co., Miss Marie Brown; Dallas Gas Co., Miss Susanna Lanham; Texas Cities Gas Co., Mrs. Mike Woods, and Lone Star Gas Co., Miss Margaret Marable.

Meetings will probably be held once a month for one hour, in the auditorium of the gas company building.

Natural Gas Bureau Entertains Power Engineers Dec. 10 and 11

The Natural Gas Bureau of Los Angeles entertained two chapters of the National Association of Power Engineers on December 10 and 11. Members of Chapter No. 2 of the Association were guests on December 10 with a steak dinner followed by entertainment and vaudeville. Roy M. Bauer, office engineer of the Southern California Gas Co. was the featured speaker. The same dinner, entertainment and talk were given on December 11 for Chapter No. 4. Following the dinner the guests were escorted through the exhibit. About 160 members of the two chapters attended.

Gain in Earnings Reported by Northern States Power Co.

Northern States Power Co., Minneapolis, Minn., reported a gain in net earnings of $670,826 for the 12 months ended October 31, showing $17,429,054 for that period as compared with $16,758,228 for the previous 12 months. Gross earnings were $33,968,559 for 1931 as compared with $33,181,690 for 1930.

Rich Hill and Hume, Mo., On Natural Gas Service

Rich Hill and Hume, Mo., will shortly be served through a line from wells near Hume, extending 12 miles to Rich Hill. The distribution systems in the two towns were completed early in December, with meter hookups under way by the 15th. The Bourbon Pipe Line Co., Hume, was in charge of all construction work.

TIE-IN ADVERTISING BRINGS

Increased Profits to Dealers

DEALERS who consistently tie in their advertising with that of Pacific Gas and Electric Company are able to point with pride to rapidly increasing profits.

The reason is obvious: P. G. and E. advertisements promote sales and advise prospects to visit their dealers' stores. The dealer's adjoining advertisement tells prospects WHERE to buy.

This company's 1932 advertising will continue to promote the advantages of gas appliances and to advise prospects to visit their dealer's stores. Dealers who tied in with P. G. and E. advertising during 1931, are planning to continue this method of increasing their sales throughout the new year.

Reproduction of a newspaper page showing how aggressive dealers tie in with P. G. and E. advertising. A constantly increasing number of prospects and sales proves the value of using tie-in advertising.

Should you desire to increase your profits, as others are doing, it will be worth your while to try tie-in advertising. Your local newspaper will gladly give you the publication dates of our advertisements.

PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed
by Californians

WG 201-132

Waterless Gas Holders, of the M.A.N. type, built exclusively in this country by The Bartlett Hayward Company, are playing a conspicuously successful part in plants which exemplify the most advance practice of today. They are also playing an equally conspicuous part in the distribution systems of scores of cities scattered over the entire country from coast to coast, as testified by the fact that over 300,000,000 cu. ft. of such storage is in service and under construction.

THE
BARTLETT HAYWARD
COMPANY

BALTIMORE — MARYLAND

Coal Gas, Carburetted Water Gas, Blue Water Gas, By-Product Plants—De-Brouwer Charging and Discharging Machines—Waste Heat Boilers—Purifiers—Tar Extractors—Condensers—Feld Scrubbers—Fast's Couplings—Gas Holders.

Public Service Co. of Colorado Completes Interesting Installation

Public Service Co. of Colorado, Denver, recently completed an interesting heating installation under the direction of C. W. Gale, superintendent of the commercial and industrial gas divisions.

Interior finishing work was forced to a stand-still in Denver's partly completed $5,000,000 City Hall on account of cold weather. The coal fuelled heating plant, a block away from the building was also incomplete, and could not be finished under a period of months. Gas company engineers installed two boilers with Webster burners, constructed a trench to a nearby 24-inch low pressure main, and ran a 4-inch connection to a point just inside the curb where two No. 5 Emco meters were installed. The company is prepared to supply 10,000 cubic feet of natural gas per hour. The load is expected to reach 4 or 5 million cubic feet per month until the permanent heating system is ready for service.

Community Natural Gas Co. Inspects Appliances in Abilene

A thorough inspection of all domestic gas appliances and house lines in Abilene, Texas, was made during December by special heating and appliance engineers of the Community Natural Gas Co., distributing company which serves the city. The engineers, Jim C. Harris, J. H. Johnston, and Fred E. Johnston, adjusted gas appliances, tested house lines for leaks, checked all home equipment, and offered other free equipment service as part of the company's home service program in the city.

Chaffin Now Manager of Vernon District for United Gas Co.

Pat Chaffin, assistant manager for Southwestern Light and Power Co. at Duncan, Texas, for the past five years, resigned that position to become district manager for the United Gas Co. at Vernon, Texas. Mr. Chaffin will be in charge of the company's affairs in Vernon, Quanah, and Chillicothe. His place with the Southwestern Light & Power Co. will be taken by A. P. Burns.

West Coast Gas and Fuel Given Right to Issue Stock

West Coast Gas and Fuel Co., San Francisco, Calif., has been authorized by the California Railroad Commission to issue and sell common stock for the purpose of qualifying its directors and acquiring franchises in Auburn and Placerville, Calif. The company plans to serve butane gas in those towns.

Service Scheduled for Palmyra; Line Construction to Begin

Panhandle Eastern Pipe Line Co., Kansas City, Mo., has secured a right-of-way for a lateral to be constructed from the main line at a point in Ralls county to serve Palmyra, Mo., where Central States Gas Utilities Co., a subsidiary, will distribute the gas.

Iowa Southern Utilities May Serve "Natural" in Osceola

Iowa Southern Utilities Co., Osceola, Iowa, expects to have natural gas by early spring, according to a statement credited to W. F. Hutchinson, manager for the company in that city.

Northwest Oil and Gas Assn. Elects Officers and Committeemen

OFFICERS and committees of the Northwest Oil and Gas Association for the coming year were selected at a meeting of the board of trustees held at Seattle on December 11. Plans were formulated for the conduct of organization activities during 1932.

E. A. Sims was re-elected president. H. S. McGowan, McGowan, Wash.; P. J. Brix, Portland, Ore., and Alex Polson, Hoquiam, Wash., were named vice-presidents. Milton S. Hurwitz, Seattle, was re-elected secretary and H. S. Sackett, Seattle, treasurer. Col. William T. Perkins was retained in office as chairman of the board.

An executive committee was named, including the executive officers and Luther Weedin, Ralph Brown, Charles D. Garfield and Dwight D. Hartman. This committee will work under the direction of the board.

Other committees appointed were:

Finance: Henry S. McGowan, chairman; H. S. Sackett, F. R. Stuben, Albert L. Hale, W. S. Newton, Sr.

Geological: Harold E. Culver, chairman; Dean Henry S. Landes, Major M. J. Hopkins, Dean John W. Finch, Henry S. McGowan.

Legislative: Dwight D. Hartman, chairman. Personnel to be selected from members who are delegates to the state legislatures.

Public Relations: Milton S. Hurwitz, chairman; P. J. Brix, Roger D. Pinneo, Luther Weedin, E. M. Stephens.

Northern Gas and Pipe Line Co. Building 1,280-foot Bridge

The pipe line suspension bridge now under construction across the Missouri River at Ponca, Neb., will be the largest bridge of its kind in the world when completed, according to the Northern Gas and Pipe Line Co., building it. Cost of the project will be in the neighborhood of $150,000.

A 1,280-foot span will carry the pipe 75 feet above the present water level and 66 feet above high water.

The main cable will be made up of 14 strands, which will be taken across the river separately and then bound together, and will weigh 28 tons. Two cables weighing 13 tons each will take care of the side push of the wind.

The towers from which the cables will be swung will be 160 feet above the water level. They will be anchored in cement 20 feet into solid rock. The pipe itself will be hung from the main cable by means of cradles every 20 feet.

O. Christopher, Mgr. at Dickinson for Montana-Dakota Power Co.

O. Christopher, formerly manager of the Montana Petroleum Co., of Baker, Mont., subsidiary to Minnesota Northern Power Co., has been appointed manager for Montana-Dakota Power Co., at Dickinson, N. D., replacing R. W. Petter. Mr. Christopher has been connected with the parent company for the past 12 years.

American Gas Construction Co. Asking Two Gas Franchises

American Gas Construction Co., Minneapolis, Minn., has applied for a franchise to serve gas in Madison, S. D., according to report. The same company is also applying at Marshall, Minn.

THE SYMBOL OF A SUCCESSFUL KITCHEN

MADSEN CALLS THE ROLL

THE test of a product is the calibre of its users. Madsen calls the roll of outstandingly successful institutions on the Pacific Coast which, for upwards of twenty years, have used Madsen Ranges and other kitchen equipment. The list is by no means complete; to these names scores of others, equally important, might be added. But the list is representative . . . it speaks more loudly for Madsen than anything we might say.

CAFES

Victor Hugo, Los Angeles
Levy's Grill, Los Angeles
Pig'n Whistle, 20 kitchens
Leighton's, 20 kitchens
Simon's Dairy Lunch, Los Angeles, 8 kitchens
Levy's Tavern, Hollywood

HOTELS

St. Francis, San Francisco
Ambassador, Los Angeles
St. Catherine's, Catalina Island
Vista del Arroyo, Pasadena
Barbara Worth, El Centro
Vista Mar Monte, Santa Barbara
San Marcos, Chandler, Ariz.
North Shore Tavern, Lake Arrowhead

CLUBS

Jonathan Club, Los Angeles
Los Angeles Athletic Club
University Club, Los Angeles
California Club, Los Angeles
Elks' Club, Los Angeles
Masonic Club, Los Angeles
Hollywood Country Club
Rancho Golf Club, Los Angeles
The Pacific Club, Honolulu

HOSPITALS

Good Samaritan, Los Angeles
Cedars of Lebanon, Los Angeles
California State Hospital, Patton
Cottage Hospital, Santa Barbara

MISCELLANEOUS

University of California at Los Angeles
Camp Curry, Yosemite
Old Faithful, Yellowstone

Big or small, there is a place in your kitchens where Madsen Ranges and other equipment can serve you with profit. Let us discuss with you plans for meeting returning prosperity half way.

MADSEN
IRON WORKS, LTD.

P. O. Box 601, Huntington Park, Calif.
(Suburb of Los Angeles)
San Francisco Factory Representative
Fred R. Sanford, 631 Second Street
MADSEN HOTEL AND RESTAURANT KITCHEN EQUIPMENT
SOLD BY LEADING EQUIPMENT DEALERS

We Can Deliver to West and Southwest
Equally as Low in Price as in Middlewest

LUX PURIFYING MATERIAL

MOST ECONOMICAL BECAUSE
MOST EFFICIENT
ALSO LASTS LONGER
QUICK DELIVERY

THE ALPHA-LUX CO., Inc.

192 Front St., New York City. Branches: Philadelphia, Chicago. Storage Base: New Orleans

LAVA

NON-CORROSIVE NON-CARBONIZING

A HIGH HEAT RESISTANT

Lava has been the means of saving perfectly good ideas from being discarded. The adaptability of the material to all types of machining operations and its characteristics when subject to extreme heat, acid, abrasions, etc., supplies you with a material that you have long been looking for.

To your individual designs
Ask for Booklet 31

AMERICAN LAVA CORPORATION
1431 William Street
CHATTANOOGA, TENN.
Manufacturers of Heat Resistant Insulators

For smart living... this exclusive apartment hotel in the heart of the famous Wilshire District, overlooking beautiful Westlake and Lafayette Parks.

Rates on Application

L. C. Reed, Manager

The Arcady
2619 WILSHIRE BLVD.
LOS ANGELES

MUELLER
GAS ERA
BOILERS

fill the most exacting demands for thoroughly dependable and economical gas-fired steam and hot water heating equipment.

For details, write:

L. J. MUELLER FURNACE CO.,
334 S. 2nd St., Milwaukee, Wis.
Makers of a complete line of gas-fired boilers and pressed steel and cast furnaces

Lukens Steel Co. Founds Industrial Fellowship at Mellon Institute

Dr. Edward R. Weidlein, director of the Mellon Institute of Industrial Research, Pittsburgh, Pa., has announced that the Lukens Steel Co. of Coatesville, Pa., has established in the Institute an industrial fellowship, the purpose of which is the scientific investigation of processes employed in the manufacture of steel plates.

Erle G. Hill, who received his professional education at the University of California, has been appointed to the incumbency of this fellowship. He is a specialist in iron and steel technology, and was previously associate professor of metallurgy in the School of Mines of the University of Pittsburgh.

Standard Gas and Electric Co.'s 1932 Budget Includes $3,319,809 for Gas

Standard Gas and Electric Co.'s preliminary construction budget for 1932 will total $25,015,966, including $3,319,809 for the gas department, according to John J. O'Brien, president of the company. Projects now under construction at properties on the Standard Gas and Electric Co. system amounting to $3,508,034 will not be completed during 1931, costs for which are included in the preliminary budget figure set up for 1932.

Engineering and construction services will be rendered by Byllesby Engineering and Management Corp., wholly owned subsidiary of Standard Gas and Electric Co.

Arkansas Valley Natural Gas Co. Opens Office in Ordway, Colo.

Arkansas Valley Natural Gas Co., headquartered at Colorado Springs, Colo., has opened an office in Ordway, Colo., with J. C. Wells of Colorado Springs as local manager. His territory will include Sugar City, Fowler and Manzanola, as well as Ordway, where service was recently begun through an extension from the Colorado Interstate Gas Co.'s line to Fort Lyon.

Cedar Vale Gas Co. Completes New Distribution System

Cedar Vale Gas Co., Cedar Vale, Kan., recently completed its distribution system in the town and has begun service there. The company is newly formed and is headed by Howard Kuhn of Hugoton as president. G. W. Leighty of Winfield is vice-president, and W. L. Sidwell of Winfield, is secretary-treasurer.

Annual Meeting of American Institute of Chemical Engineers

The 24th Annual Meeting of the American Institute of Chemical Engineers was held at Atlantic City, N. J., December 9-11, 1931. Office of the Institute is maintained in the Bellvue Court Building, Philadelphia, Pa.

130,000,000 c.f. Well in Lea County

Continental Oil Co. in December brought in a gas well with a production of 138,500,000 cubic feet daily. The new well is in the Hobbs pool of New Mexico at the northern end of Lea County's productive area.

Applies for Pipestone Franchise

Peoples Natural Gas Co., Omaha, Neb., has applied for a franchise for the service of natural gas in Pipestone, Minn., with late December scheduled as the time for the final reading.

Classified Advertising

Classified advertising five cents per word; minimum $2.00 per insertion. Situation Wanted advertisements up to 50 words will be published three consecutive issues without charge. Small professional cards 1-in. deep by 21 ems wide are $5.00 monthly on 12-time contract.

FOR SALE

For sale cheap—Proven gas acreage, large holdings, tremendous gassers, choicest in country. P. O. Box 683, Ft. Worth, Texas.

SITUATIONS WANTED—MALE

Mechanical and electrical engineer, age 46, with ability to speak Spanish, seeks position. Applicant is experienced in work with butane gas, having installed and put into operation 15 butane plants on Pacific Coast, and has had 20 years experience in supervising construction and as local manager of gas and electric company. Address Box E-169, *Western Gas,* 124 West Fourth Street, Los Angeles, Calif.

Manager of gas company with 10 years experience desires to make connection with larger utility where ability to produce will win advancement. Location immaterial. Detailed experience and references furnished. Address Box E-165, *Western Gas,* 124 West Fourth Street, Los Angeles, Calif.

Married man, 19 years experience in construction, operation and maintenance of high-pressure natural gas mains, desires position. Applicant will go anywhere, and will do any kind of work, but prefers maintenance of high pressure line. Can supply good references. Address Box E-167, *Western Gas,* 124 West Fourth Street, Los Angeles, Calif.

Accountant and auditor, several years practical diversified experience, including service with gas companies, desires position. Applicant is competent to take charge and can prepare financial and other supporting statements, including tax matters. Location immaterial, will work for moderate salary. Can supply references. Address Box E-163, *Western Gas,* 124 West Fourth Street, Los Angeles, Calif.

Mechanical engineer and draftsman experienced in laying out, drawing plans, and writing construction specifications for gas compressor stations and natural gas absorption plants, also in supervision of construction, desires position with company needing qualified man. Applicant's age, 29 years, References and record of experience supplied. Employment duration and location im-

Welding Quality
Welding Speed

124 miles of the Southern Fuel Line were PRICE-WELDED using the Electric Shielded Arc Method, and was completed considerably ahead of schedule.

H. C. PRICE, Inc.
Formerly
WELDING ENGINEERING CO.
Bartlesville, Okla.

SUBSTANTIAL REDUCTION ON VENTED CLOW GASTEAM RADIATORS

WRITE for NEW PRICES

JAMES B. CLOW & SONS
201-299 N. Talman Avenue, Chicago

We Congratulate

SOUTHERN FUEL COMPANY

For its splendid achievement and wish it every success during the ensuing year.

ASBURY TRANSPORTATION CO.
Alameda at 49th Street Los Angeles, Calif.

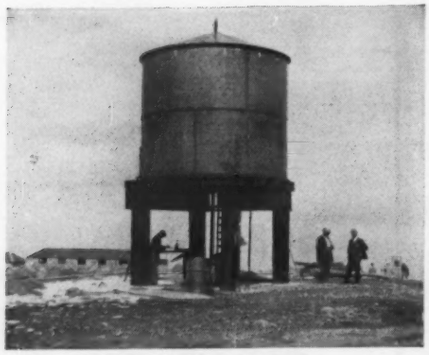
White Truck & Transfer Co.

Pipe Line Trucking

Truck Transportation for Public Utilities

4950 Santa Fe Ave.

Phone JE 4204 **Los Angeles**



Still a Settin' on Top of the World

Five years ago this tank on the summit of Pike's Peak, Colorado, was protected inside and outside with NO-OX-ID.

For a test of severe weathering, the summit of Pike's Peak, 14,000 feet above sea level, is a choice spot—yet following a recent inspection, the coating was reported to be "holding up well."

Where can NO-OX-ID serve you? Inquiries invited.

Dearborn Chemical Company
LOS ANGELES:
807 Mateo Street Phone TRinity 3385
SAN FRANCISCO:
421 Bryant Street Phone DAvenport 658

NO-OX-ID
IRON-OX-RUST
The Original Rust Preventive

Cut Out the Coddling!

With McWane-Pacific CAST IRON gas pipe, coating and coddling are unnecessary: you lay it and forget it.

Permanent pipe because it's cast iron; gas-tight joints because there's a McWane-Pacific joint for every pressure.

Long lengths; sizes as small as 1¼ and 2 inches. Prompt shipment from two foundries. Get Booklet today.

McWANE CAST IRON PIPE CO. BIRMINGHAM ALABAMA

PACIFIC STATES CAST IRON PIPE CO. PROVO, UTAH

SAN FRANCISCO CHICAGO LOS ANGELES KANSAS CITY
PORTLAND, ORE. DALLAS DENVER SALT LAKE CITY

VITEX
GAS VENT AND FLUE PIPE
Light – Durable
Insulating
Non-corrosive
PLANT RUBBER and ASBESTOS WORKS
537 Brannan Street · San Francisco
PR-102

The WILCOLATOR
OVEN HEAT CONTROL

The WILCOSTAT
ROOM TEMPERATURE CONTROL

The WILCOLATOR Co. Newark N.J.

material. Address Box E-173, *Western Gas*, 124 West Fourth Street, Los Angeles, Calif.

Natural gas engineer, 34 years of age, married, seeks position. Applicant has had 12 years experience in new business, public relations, furnace conversions, valuation and main line and distribution system construction. With the exception of 2 years this experience has been in the Mid-Continent field in new gas territory. Address E-Box 175, *Western Gas*, 124 West Fourth St., Los Angeles, Calif.

Construction and field engineer desires position, location immaterial. Applicant has had seven years experience on pipe line construction, layouts, mapping, surveying, and as building superintendent, and also two years experience on butane systems. References furnished. Address Box E-177, *Western Gas*, 124 West Fourth Street, Los Angeles, Calif.

Salesmanager, now employed, wishes to make change. Six years experience with natural gas. Understands gas appliance merchandising, installations, conversion jobs, etc. Applicant is 30 years of age and married. Can furnish references. Prefer to locate in Northwest States. Address Box E-171, *Western Gas*, 124 West Fourth Street, Los Angeles, Calif.

10,000,000 c. f. Daily Added to Peoples Gas & Electric Co.'s Load

The Northwestern States Portland Cement Co., Mason City, Iowa, said to be the largest cement plant west of the Mississippi River, is now using natural gas in its furnaces, supplied to the company by the Peoples Gas & Electric Co., who secures it from Northern Gas and Pipe Line Co. of Omaha.

The plant is equipped with 12 rotary kilns, each kiln being connected to a single giant Bunsen burner which uses from 33,000 to 40,000 cubic feet of natural gas per hour. In these kilns the clinker is brought to a temperature of about 2,650° F. The plant consumes about 10,000,000 cubic feet of natural gas every 24 hours and turns out 3,000,000 barrels of portland cement each year.

Semet-Solvay Co. is Now Manufacturing Aluminum Paint

Semet-Solvay Co., headquartered in New York, announces the production of a new aluminum paint, in addition to its line of protective paints for application on metal, wood, stone, brick, concrete or plaster.

In Bulletin No. 44, recently brought from the press, the company's entire line of piping, valves and fittings is described, including illustrations of typical pipe systems, special design fittings, piping plans, and other related subjects. The bulletin also contains several tables of dimensions, etc.

Texas Cities Gas Co. Reports Gain in Consumers in 1931

The largest number of customers in the history of the Texas Cities Gas Co. of Galveston, Texas, 8,427, are now being served by the company, according to P. E. Nicholls, local manager. This year's total shows an increase of 394 customers over the previous year, and there was a net gain of 114 customers during the first week in December, 1931.

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No. 604-M

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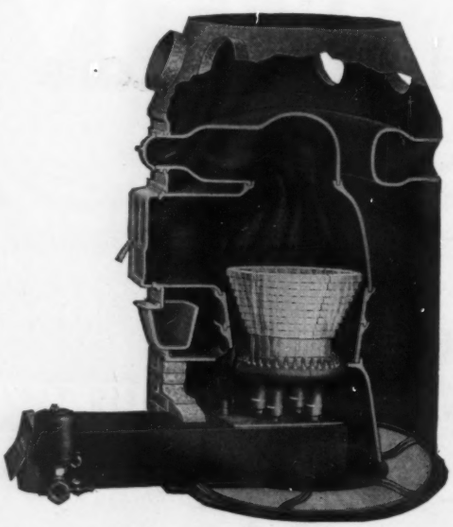

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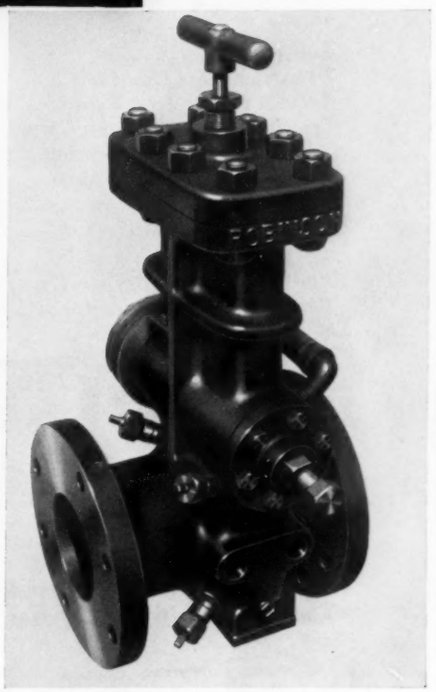

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